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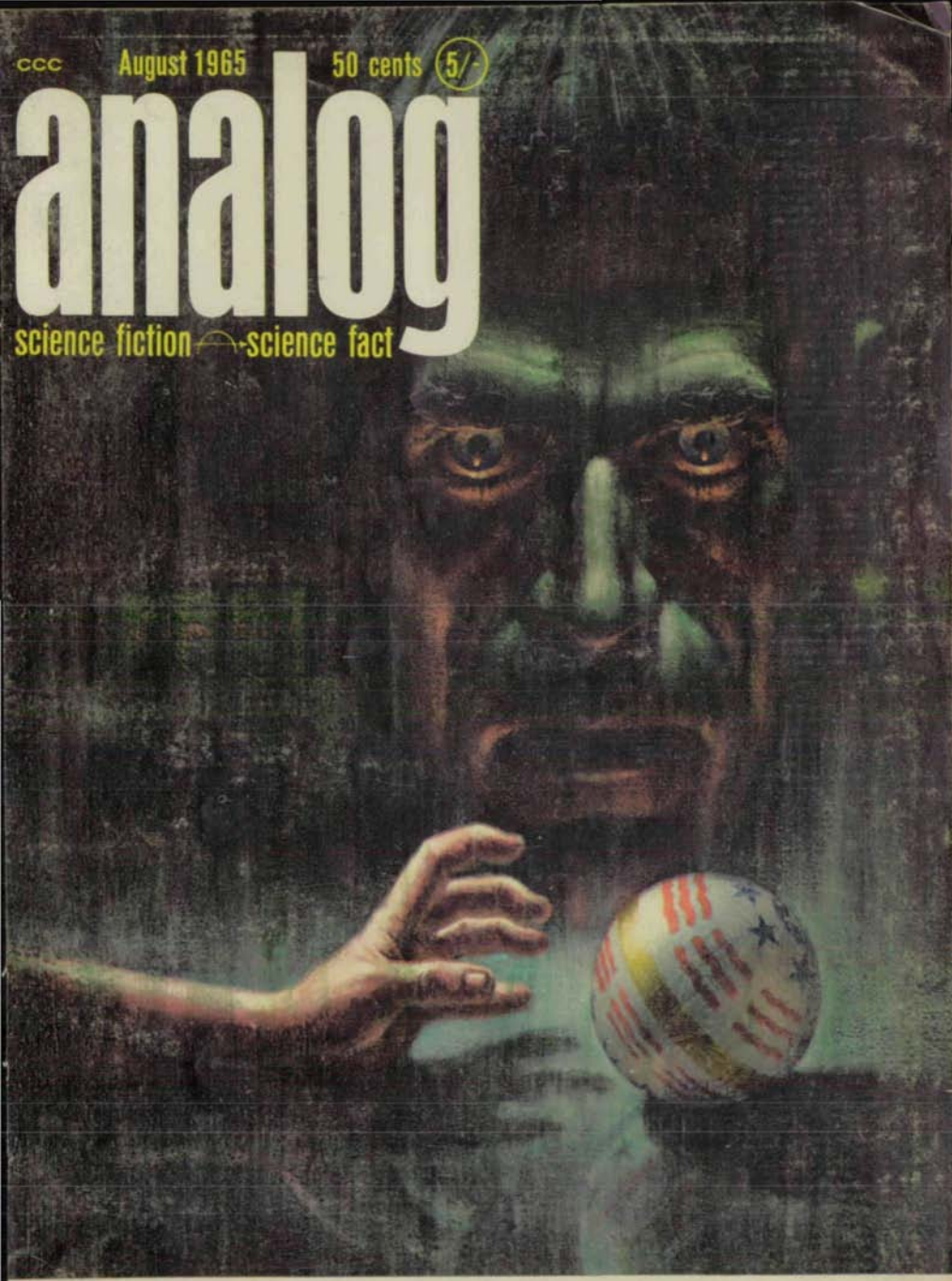

HALF A LOAF... BY R. C. FITZPATRICK

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The record-smashing winner of the 1965 Masters, golf champion **JACK NICKLAUS,** tells you 55 ways to lower your golf score

JACK NICKLAUS

When to chip with a putting stroke from off the green. (See p. 91)

"THE VICTORY by Jack Nicklaus in the Masters," says Bobby Jones, in the *New York Times*, "was the greatest tournament performance in golf history."

Now, in his first book, MY 55 WAYS TO LOWER YOUR GOLF SCORE, Nicklaus shows you how to slash strokes from your game. It is a step-by-step revelation of his approach, his golf thinking, and his championship technique.

Here is what he has to say about his book:

"Some time ago, *Sports Illustrated* invited me to do a series of articles. They teamed me up with Francis Golden, a brilliant artist who knows the mechanics of the game of golf almost as well as I do. Between us, we came up with what I honestly feel is a *new kind* of golf instruction: *pictures* that so clearly show such things as firm grip, smooth stroke, movements of arms and legs, that the word explanations can always be short and absolutely to the point. The lavish use of as many as four colors per picture — plus a series of color arrows, properly placed — make this possible.

"Those magazine articles, which originally started out as a ten-parter, were so well received that they grew and grew — first into a regular feature, and now, this book. I'm very proud of my book, because over the years I've read just about everyone *else's* golf book. And while some of them were helpful, too many of them (in my opinion) take you too far back from where you happen to be. Others strain at picking the specks out of the pepper, or overemphasize one phase of the game at the expense of others. I don't fall into any of these traps.

Here we go . . . my 55 ways

"You're not going to agree with everything I say — because I don't believe in *all* the generally accepted principles of golf. But *everything* I tell you, I've profited from. And as you know, I've had a fair degree of success. So let's go.

"You'll find out why so many touring pros cock their heads just before starting their backswing . . . when a 1-iron is better than a 4-wood . . . how the proper tempo of your swing can make a big improvement on your present game.

"You'll see how to lick narrow holes with a controlled fade . . . how to execute an often overlooked but vital element in the intentional hook.

"If tension is high and you need only to put a medium approach shot into the middle of the 18th green and two-putt to break 90 (or take a Nassau or win the Club championship), I'll show you how the pros do it. I'll also show you how to hit a shot that is quite difficult for most golfers, but vital for a better score: the long full iron from a fairway sand trap.

How to use the right knee for extra power. (See p. 22)

You benefit from tournament tactics

"Every one of the 55 situations I tell you about in my book has come up in actual play. Many times, specific tournament instances are cited. And frequently, *I'll tell you what other pros do.* For example, you'll get a tip I learned from Jack Burke on how to get more accurate distance and aim on putts. And you'll see why Gary Player — who is only 5 feet 7 — uses a shaft one inch *longer* than most other pros.

"In my book you'll also get answers to the 'whys' and 'hows' that so often bug you in the course of play. How can you hit a long-iron approach shot that will clear bunkers and hazards in front of the green, yet stay out of trouble *behind the green?* How can you *easily* hit a ball in a divot mark or in a bad fairway lie?

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"And while we're on the subject of "frustration," let's not forget that old bugaboo, putting. I show you how to eliminate those nightmare three-putt greens; how to get the short putts down consistently; when to putt from a *trap.*

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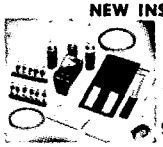

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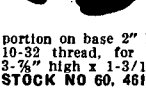

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Next issue on sale
August 10, 1965
$5.00 per year in
the U.S.A.
50 cents per copy

Cover by
Kelly Freas

analog
science fiction—science fact

Vol. LXXV, No. 6 August 1965

NOVELETTE
HALF A LOAF, R. C. FitzPatrick 8

SHORT STORIES
POSITIVE FEEDBACK, Christopher Anvil 47
SLEEP NO MORE, James H. Schmitz 80
FIGHTING DIVISION, Randall Garrett 97

SERIAL
TRADER TEAM, Poul Anderson 107
(Conclusion)

SCIENCE FACT
MICROMINIATURE INDUSTRY, Carl A. Larson 64

READER'S DEPARTMENTS
THE EDITOR'S PAGE 5
IN TIMES TO COME 46
THE REFERENCE LIBRARY, P. Schuyler Miller 151
BRASS TACKS 155

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Analog Science Fiction/Science Fact is published monthly by The Conde Nast Publications Inc. Editorial and advertising offices: 420 Lexington Avenue, New York, N. Y. 10017. Executive and publishing offices: Greenwich, Connecticut. I.S.V.-Patcevitch, President; Alfred W. Cook, Treasurer; Mary E. Campbell, Secretary. Second class postage paid at Greenwich, Connecticut, and at additional mailing offices, under the Act of March 3, 1879. Subscriptions: In U. S., possessions and Canada, $5 for one year, $9 for two years, $12 for three years. Elsewhere, $7.50 for one year, $15 for two years. Payable in advance. Single copies: In U. S., possessions and Canada, 50¢. Six weeks are required for change of address. In ordering a change, write to Analog Science Fiction/Science Fact, Boulder, Colorado. Give both new and old address as printed on last label. The editorial contents have not been published before, are protected by copyright and cannot be reprinted without the publisher's permission. All stories in this magazine are fiction. No actual persons are designated by name or character. Any similarity is coincidental. We cannot accept responsibility for unsolicited manuscripts or art work. Any material submitted must include return postage.

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PANACEA

EDITORIAL BY JOHN W. CAMPBELL

Education is currently very widely held to be the Great Panacea for all ills. Whether the problem be social, economic, international, or physical —Education, we are told, is all that's needed. The trouble with the backward nations is that they, unfortunately, didn't have the Educational Opportunities the Western nations did. The Juvenile Delinquent and the Underprivileged People alike are what they are for lack of Education.

The difficulty with that is that, as usual, the term "Education" is undefined—very, very carefully undefined, because to define it will be a most uncomfortable-for-the-liberal-theorists type of operation.

"Education" refers to both a process, and a result.

The various definitions of the result—of what "an education" is—are bad enough. But the real trouble, the source of battle, murder and sudden death throughout the world and throughout history, rests on the definition of that process.

"Education" in the sense of the process—teaching—is, in fact, one of the few universally despised, hated, and cursed things on which all men everywhere agree.

Education is, simply, Slavery.

Doubt it?

First recognize what Slavery is. It's not a legally-definable, objectively describable state. A man may

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purchase a girl in the local slave market; legally, she is his chattel, to do with as he will. But if they come to love each other—is she a slave? On the other hand, the young queen of Siam, in "The King and I," was legally a queen. But she said she was a slave, and begged the king to free her.

In older times, slaves weren't purchased; they were captured. But remember that in those times, too, marriage by capture was culturally common . . . whether the "capture" was arranged beforehand or not.

Slavery is a subjective phenomenon; it is the emotionally painful situation of being forced to learn and carry out a new way of life which you do not choose. Its essence is the loss of freedom of choice.

Note that freedom of choice may be regained, *without escape from the situation.* That is, with no change in the objective or legal situation, full freedom of choice may be regained.

Consider the girl who has been captured and enslaved, against her will and by violence. She is a slave; it is an emotionally painful situation, and she has been deprived of free will. But history is full of a thousand thousand such instances, where the woman came to genuinely, wholeheartedly and devotedly love the man who had captured her. Now she's still a captive; she still cannot return to her former home. But—now she doesn't want to, so, since she is doing what she freely chooses to do—she's still a captive (objective situation) but no longer a slave (subjective situation).

So the essence of slavery is the loss of freedom of choice—being compelled to learn a new way of life.

The essence of education-the-process is teaching the pupil a new way of life, a new set of values and goals, a set of ideas which he did not choose to have before.

The captive girl slave who learns to love her master has been taught a new system of judgments and values; she's been educated.

Sure—I know! I *know* that's not what you mean (you think!) by education.

Now let's look at history as to what teaching has, in fact, not theory, meant.

"We've got to teach them a lesson," has usually meant the intention of applying force and pain to change the value-judgments of an opposing group. Education, in other words.

It's necessary to distinguish carefully between *learning* and *teaching;* the simplest example is that an average ten-year-old American boy *learns* to play baseball, but has to be *taught* to play the piano.

That is, if there is a skill which you have already chosen as being worth the time, effort, and energy involved in achieving—you will *learn.* But another skill which you

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hold to be of low value, or of negative value itself, which requires great amounts of time, effort, and energy—a highly unprofitable-in-your-terms thing—you will have to be taught.

Now in the language, "to be taught" is a passive verb, while "to teach" is active. Since human groups have, over the centuries, most actively resisted would-be teachers, "to be taught" is by no means passive-in-fact. The small boy wouldn't-be piano player, for instance, will develop agility both physical and mental seeking to escape the chore. (And remember that slavery is sometimes described as "having to perform chores not of your own choosing, under threat of physical punishment if you fail, and of arrest and return if you seek to escape.")

Briefly, Education may be a Panacea—but the process of applying it does, in actuality, involve enslaving the pupils. That's why war has, down through the ages, led to so much intellectual and social progress—it's highly educational.

An education is one of those things like having an aching tooth pulled—a great idea once it's over. You can heartily recommend it to all your friends with similar complaints. But they don't look forward to it with anything like the attitude that you look back on it.

An education—the result—is something everyone wants to *have*, but doesn't want to *get*. People want to *be* educated—not *become* educated.

Note that the time, effort and mental energy a teen-age boy will invest in learning all the players, their batting averages, their major league records, and all the team standings is at least equivalent to that required to achieve an A+ standing in freshman college chemistry. The amount and type of mental effort involved is very similar. Instead of Mantle and Mays we have hydrogen and sodium. Instead of American and National leagues, we have acids and bases. For batting averages, we substitute the electromotive series.

In practical terms—if you want to learn something, you may seek a tutor (the kid down the block who already knows) but "want to know" implies, necessarily, that you're already convinced that the process of learning will yield a worthwhile goal.

The boy who sees that knowing baseball data is profitable-in-his-terms learns the material easily.

Because he does not see that learning valences, structural formulas and atomic weights is profitable-in-his-terms, he has to be enslaved, and taught chemistry.

Now you know and I know that learning the baseball data isn't going to be useful to him for very long, while learning the chemical data can be the foundation of a life-

continued on page 159

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HALF A LOAF...

There was something going on at that sanatarium for children that was most peculiar—and it definitely violated medical ethics. But one universal Law of Ethics remains "It is unethical to demand the impossible of anyone."

R. C. FITZPATRICK

The hospital corridor was muted. Two men stood there in the early afternoon calm and looked through a two-way mirror into the room beyond. The man on the left, the man in the white smock, wore a look of deliberate indifference. The other, the man in the frayed business suit, wore a look of determined indifference.

The room beyond was a playroom. Cheerful and bright. Through the columned walls, airy with windows, the rays of the summer sun highlighted an area of light yellow linoleum, inlaid with checkerboards of red and blue squares, hopscotch patterns marked-off with pale green lines, and black lined circles, with circles within circles, for group therapy games. Toys were carefully/casually scattered everywhere, placed where a young child, or a young child's hand might find them; and finding them, might pick them up and play.

In the center of this artful expanse of happiness a young woman was kneeling. She seemed carefree and confident and if her smile was forced it was not apparent. She was in the act of throwing a ball. Directly across from her, ten feet away, a little boy stood awkwardly, with his legs akimbo; his right knee was touching his left calf about halfway down, and the toes of his feet almost met each other head-on. He braced himself and

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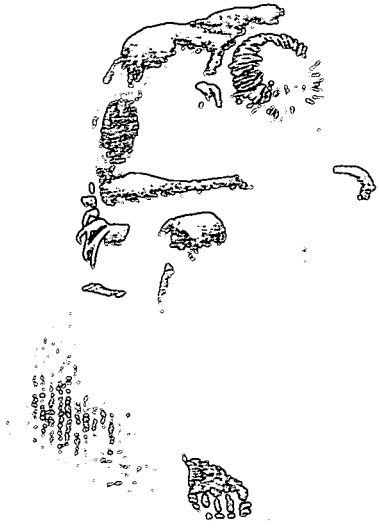
laboriously tilted one shoulder forward and up, in an agonizing effort to make his head face toward the social worker.

"*Tommy.*" said Tommy-Eyes. "*she's going to throw the ball toward Tommy-Stomach.*" It was not a very specific instruction, but it was useless for Tommy-Eyes to say anything more. "*Tommy-Brain.*" said Tommy. "*tell Tommy-Nerves.*" "*Which nerves?*" asked Tommy-Brain. "*I don't know which nerves.*" said Tommy. "*you're the brain.*" "*I'll try.*" said Tommy-Brain. "*Tommy-Nerves,*" said Tommy-Brain. "*tell Tommy-Muscles.*" "*All the muscles?*" asked Tommy-Nerves. "*All the muscles that might help.*" said Tommy-Brain.

And across from the social worker, the little boy forced his reluctant arms upward and outward. And then, by sheer determination, he made his wrists cross over each other, so that by holding his elbows in tight to his body his forearms formed a basket of sorts. The social worker took careful aim and underhanded the ball in a slow and gentle arc. And the little boy, by



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standing still, was able to catch the ball in his forearms. Then, slowly and carefully, he drew his right wrist up across his left forearm toward his body. He almost had the ball in his grasp when his elbow involuntarily lifted away from his body and the ball fell to the floor. Not giving up, not even considering giving up, the little boy made his body stoop and his arm go out to pick it up. His groping fingers missed the ball by six inches. Tears began to well in his eyes.

"Don't cry!" said Tommy to Tommy-Brain. *"Don't cry!"* said Tommy-Brain to Tommy-Eyes. *"Don't cry!"* said Tommy-Eyes to Tommy-Tear Ducts. But the body, which would not obey before, would not obey now. Tears started their slow, deliberate trek across the child's face. And somewhere inside, a lively, healthy mind started screaming in frustration.

"Doctor," said the man in the frayed business suit, "I am not going to talk about it any more. I want my boy. Now!" The man's voice went flat with anger. "This is the fifth hospital, and you are the eighth doctor. And the results are always the same!" The man's anger was defensive. "It has to end somewhere."

The doctor, who had seemed indifferent before, seemed indifferent now. Original interest had been replaced with an enforced detachment, but when he turned, his shoulders were unconsciously stooped by defeat. "All right, Mr. Magee," said the doctor. He indicated the social worker, "Miss Hahn will help you get the child ready."

After the man and boy had gone, the social worker returned to the playroom. She was an attractive woman of twenty-five. Auburn haired and tall and a trifle overweight. Her full, rich features mirrored her every motion, but her only emotion now was bewilderment. It showed in her actions as well as her face. She stooped and picked up the ball she had been playing with before, then she aimlessly began to toss it from hand to hand. Frustration had not yet given way to anger.

She said, looking directly at Dr. Mordecai Schorin: "Kai, how can anyone be so callous?"

Kai was thirty-six years old and appeared to be forty-six. The last eight years of his career had been spent in the treatment of children. And their parents. He had become resigned to the inevitable. "It's not too hard," he said softly. "In his case it's not hard at all. The man has three other children . . . healthy children . . . and a wife. And he's the assistant manager of a super market. He might make six thousand a year, maybe seven if he works a lot of overtime. What would you do?"

"What would I do?" said the social worker. "I wouldn't give up,

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that's what I'd do!" Her name was Sylvia Hahn. "Nobody has to give up! There are agencies. There are people who will help."

"Sure there are, Syl," said the doctor. "After he's gone as far as he can there are lots of places to get help . . . after he's gone as far as he can. After he's gone through his kids' bicycles, and his wife's winter coat. After he's traded in his four-year-old used car for an eight-year-old used car. After he's sold the car and takes the bus. After he's doomed his other kids to no college, and no play, and maybe no senior prom. After . . . what the hell, I might do the same thing myself."

"You wouldn't," said Sylvia fiercely.

"How the devil do I know if I would or wouldn't, Syl," said Kai. "Do you know what Mr. Magee asked me? He asked me how long Tommy would live. He didn't ask me how long he might live, he asked me how long he would live. And I answered him. A straight answer because I felt I had to. I gave him the answer in the same sense as he asked the question. I told him Tommy might live to be twelve. And I probably condensed it a bit, the boy has a tremendous will to live, he may last longer than that. Isn't that hell! He may live longer than that. In spite of what little we can do for him now."

"But . . ." Sylvia began.

"No 'buts' Syl," said Kai. "The man is his father. If anyone deserves a flat answer, he does. So no 'ifs', no 'maybes', no 'just waits'. I believe in the wonders of science, Syl, I even believe in miracles. So does my religion. So do the Catholics and Protestants. So do the atheists, for that matter. We all believe in science, and we all believe in miracles. But what about a father, Syl? The miracle here would be if the boy stays alive! What about a father who has three healthy kids? Three healthy kids he also loves! And a wife he loves! How can he believe in miracles? Hell and Damnation! How can he even believe in science if all we tell him is, 'hold on, there's always hope'? Hope for what? That his defective child might sap him for the next twelve years instead of the next four. The man had a rough decision to make, and he made it. You don't agree with him, and neither do I, but don't condemn him for it. Maybe he's made the right choice. Who are we to judge?"

"But he just can't bury Tommy," Sylvia cried.

"He's not burying him," Kai answered. "He told me he's putting him in a home. Sunnydale, or Sonnyville, or something like that. It's run by a doctor named Jensen. Seems to me I read something about him some place . . . no matter. They won't help the boy, they won't even try. But they'll feed him, and make him comfortable, and see to it that he doesn't hurt

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himself. And they'll do it for eighty-five dollars a month. We charge him twice that much for a week here."

"I've never heard of Dr. Jensen," said Sylvia. "Or of Sunnydale. Where is it?"

"How do I know?" said Kai. "The woods are full of these final resting places." He snorted. "Sentient cemeteries. There must be dozens of them, but they're all checked-out by the authorities. Government health agencies aren't a boondoggle any more, Syl, they do their jobs. You can be sure the boy will get decent care."

"Decent care isn't enough," said Sylvia angrily. "And Tommy is not just 'the boy'. He's bright and lively and full of fight. And I don't know anything about Sunnydale."

"Well neither do I," Kai snapped.

"But I'm supposed to," Sylvia wailed. "That's my job."

"Then find out about it," said Kai in an apologetic tone. "But don't bother me. Possibly you can afford to get emotionally involved with your patients, but I can't. I have to be callous myself, Queen Bee. As of now I'm going to forget about Tommy."

On the other side of town, standing in an alley, an eight-year-old boy was playing catch. People called him "Harry", but that really doesn't matter. He did not know his name. It was two o'clock in the afternoon, a Tuesday afternoon, and the boy should have been on a trip. Every Tuesday, in the summer, the children of the neighborhood were taken on a trip. It was that kind of a neighborhood. But the boy didn't care, and the people who took the children on the trip didn't care, and the parents, if any, weren't concerned enough to care.

The alley was four feet wide. A bleak expanse of concrete wall on one side; where a factory ended. And chipped brick on the other side; the last wall in the last house of a row of tenements. At the back the alley took a ninety degree turn, as the factory's concrete form bent behind the tenements. The boy standing in the alley was bouncing a ball against this wall.

"Brain," said Eyes, *"a two and one quarter inch spheroid is traveling back towards us at a speed of eighty-four feet per second, in an arc beginning at a point precisely ninety-two and one half inches above the level we are standing on. In three-twelfths of a second it will be at a point exactly forty-two inches above this level, ten inches in front of us, and three and one quarter inches off to the left, using a line drawn from the center of the nose to the left big toe as a meridian."*

The eyes, of course, didn't say all this, they simply passed the information they received on to the brain. And the brain relayed it instantly to the nerves and muscles. There were no delays, and no syn-

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aptic pauses. There was absolutely nothing standing in the way of the instantaneous transfer of information from eyes to fingertips. Absolutely nothing.

The eight-year-old imbecile caught the ball deftly and flipped it back against the wall for the umpteenth time. He had started playing catch by chance, when a passing postman had first thrown the ball against the wall for him. He would go on throwing the ball against the wall until another chance incident stopped him.

And he was stopped. But the incident that stopped him this time was not by chance. A man stopped him deliberately. A carefully nondescript man. A middle-aged man, in a middle-aged suit, who drove up in a middle-aged car.

Somehow the man seemed to exude authority. Not the authority of officialdom, nor the authority of position, but the more subtle authority of a purposeful man simply going about his business. The man was not looking for trouble, and if trouble came his way he would avoid it if possible. If it were not possible, he would know how to handle it. Therefore no trouble came his way. For the people of Harry's neighborhood were experts on authority. And they did not mess with authority. They either messed it up, or they ignored it. This time they chose to ignore it, and for that the man was thankful. The man's name was Evans.

He walked over to the little boy and put an arm around his shoulders. He might have said, "Come on, Harry," since he knew the little boy's name, but he did not. Instead he just ruffled the hair on his head.

He led Harry over to his car and opened the door. The boy looked up with incurious eyes. "That's a nice fella," said Evans and helped him inside. Then he walked around to the driver's side, climbed in, and drove away.

"Wilkes-Barre Control; Wilkes-Barre Control: this is New York copter 487M; copter 487M: pilot, Sylvia Hahn; Sylvia Hahn. Requesting manual control. May I have manual control, please. My destination is Canandensis; I am flying to Canandensis. I am over Berwick now."

"487M, this is Wilkes-Barre Control; Wilkes-Barre Control. Keep in touch, Lady, you overshot your target. You should have turned off forty miles back. Next time, cut out when you're over Muncy Valley. I'm going to take you up to 2,700 feet. When your indicator light flashes yellow you'll be on your own. But hold at 2,700 feet, please. Repeat, hold at 2,700 feet, traffic's a little heavy today. Do you know your proper heading?"

"Yes. Thanks, Officer, I can take it from here."

Sylvia punched in the proper course and headed for Cananden-

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sis. On the thirty-minute flight to her destination, she mulled over her approach to Sunnyvale and the problem of Tommy Magee. Originally she had simply planned to offer her services on a short term basis, in order to help Tommy get settled in his new home. But it had taken her three weeks to find the right Sunnyvale. No one, including the Magees, could or would aid her. Now Sylvia wanted more than just to help him temporarily. She wanted to help—period. After her three long weeks of head knocking, Sylvia was ready to declare war on the peoples of New York, Pennsylvania, Ohio, and most of the rest of the human race. That so many people could be so indifferent to such a wonderful little boy . . .

Her automatic timer buzzed a warning when she was near to Canandensis. She tried to get her bearings, but the co-ordinates supplied by the Buffalo Triple ABA were a trifle vague. She located a gas station and settled down.

"I can't seem to spot the Sunnyvale Nursing Home from the air," Sylvia said to the young attendant. "I'll trade you a tankful of gas for the right directions."

The attendant waved his hand in a deprecating gesture, "Nah, forget it, Lady, you don't have to buy no gas. You mean the private school, don't you?"

"Well, it's a private hospital . . ." Sylvia began.

"Yeah," said the attendant. "I think I know the one you mean. It's right over there." He pointed. "About seven, eight miles. See the steeple? Now, right behind that, see the hogback?"

"Nnnnoooo," said Sylvia.

"Look! See the break in the trees? Now, off to the left, see that hill . . . seems to run crosswise to the other hills? Just follow that! Fly right out over the steeple and right down the spine of that hill. Six, seven miles, you'll come to a big meadow. You'll see the kids out playing. That'll be it."

"Thanks," said Sylvia. "How high do I have to stay over town?"

"Just don't hit anything," said the attendant. "No air traps around here, it scares away the tourists. When you come to the school just land anywhere outside the fence. They'll send a guard out to pick you up."

"Guards?" said Sylvia.

"Guards . . . keepers . . . you know," the attendant shrugged. "They ain't trying to lock the kids in, just keep the tourists out. It looks too much like a big hotel."

"Well, thanks again," said Sylvia. She set her rotors for slow rise and started off. At two hundred feet she checked her ascent and headed in the home's direction. Five minutes later she was over the meadow the attendant had described, and spied the building nestled in the trees.

Sylvia brought her ship down

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smartly on the home's private parking lot. Hidden by the trees, it did not appear as large as it was. Preoccupied by landing, Sylvia was still able to make out at least three dozen copters and twice that many ground cars. It occurred to her that the personnel staffing the home must comprise a small battalion. With the exception of staff members, most medical help could not afford private transportation.

She turned off her rotors, folded the blades, and set her ground anchor. Then she busied herself by prettying-up while she waited for a guard to appear. She did not have long to wait, but when he did appear Sylvia was a bit disappointed. He was not exactly slovenly, but he had an unpressed look, as though he had thrown on the uniform as an afterthought. He definitely needed a haircut, his uniform had a button missing, and a spot of polish would not have been amiss on his shoes.

His opening gambit was not well pressed either. He said, "Yeah?"

Sylvia set her teeth and looked haughtily surprised.

"Yeah, Miss?" he said.

Sylvia thawed slightly. "My name is Sylvia Hahn. If I may, I'd like to see your Personnel Director about a position."

"We ain't hiring," said the guard.

Sylvia looked haughty again.

"They ain't hiring," said the guard.

"Oh, come on now," said Sylvia. "At least let me speak with him. I've had considerable experience, and I'm familiar with one of your new patients."

"You come about a patient or a job?" the guard asked.

"Now you see here . . ." Sylvia began.

"We ain't supposed to admit nobody but parents," said the guard.

"Oh, please," said Sylvia. She decided that here it would be more politic for her to be the forlorn little girl, rather than the competent career woman. "I've just flown all the way down from Buffalo. At least let the Director tell me, 'No!'."

"Well . . ." said the guard.

"Please." Sylvia twinkled prettily. "Even if he won't hire me, maybe he'll let me see Tommy." She paused. "You've just admitted a boy named Tommy Magee. He used to be a patient of mine."

"We got pretty strict rules," said the guard.

Sylvia made a crossing gesture over her heart and smiled even harder. "Male-type Parents Smile Number Two", she called it; it was a gentle appeal for understanding, with just the right amount of authority blended in with sex appeal. "I promise not to upset your routine . . . we had our own programs, too. I understand. But I know the little guy has had a tough readjustment period, and we got to be such great friends before. I'd love to see him, and I know he'd love to see me, too. Please,

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can't you just ask the Director, then I'll do anything you say."

"O.K." said the guard relenting. "You wait right here. I won't promise nothing, but I'll see." He turned and trudged off across the parking lot. Once on the institution grounds, no creases appeared in his trousers, but the unpressed look vanished from his face. He entered the main building and knocked on the conference room door.

A woman seated in the back row near the door got up and let him in. Evans nodded his thanks and walked down the short aisle to the table in the center of the room. The room itself was not overly large, but there were close to two hundred people present. There were four rows of folding chairs placed completely around the walls, and a fifth row of chairs encircling a large table in the center. There were six seats at the table, one for Dr. Jensen, one for his nurse, and one, now empty, for Evans. The remaining three seats, and the folding chairs surrounding, were used on a random basis. First come, first seated. There were too many important people in the room to establish precedence. Very important people. There was a senator named Gilham, a Marine Corps general named Tullin, and a business executive named Legion. The group was almost evenly divided, half male, half female, although there were a few single people present.

Evans did not resume his seat. He stood behind the fifth row and spoke to Dr. Jensen. He did not lower his voice. Everyone there present in the room had an interest in what he had to say. "We've got us a visitor out here, Stephen. I think you'd better see her." He wrinkled his forehead. "I think she's legitimate, but I think she's looking, too. She's not family."

The doctor straightened in his chair.

"She gave me that half-sex, half-soap routine." Evans smiled. "With just a leettle bit of authority mixed-in to show me who was boss. She's looking for a job, and she's looking for that new one, Tommy Magee. Or maybe the other way around. Or maybe neither. I'll let you decide. Either way, she may only be a nurse, but I'll wager she's astute to boot. She seems to have that innate capacity for seeing people and their surroundings at the same time." He flicked a finger at the missing button on his coat. "Like a blinkin' H'inspector General. I don't wear this thing often enough to keep it in repair."

"Philip," said Dr. Jensen, "for now you're only an orderly . . . remember? Where did she come from?"

"I'd guess from the same hospital that had the boy before," the guard answered.

"In that case, perhaps I'd better see her," said the doctor, "but not here. Bring her over to the West

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Wing, it looks less like a hospital and more like a home."

"And Philip," said the doctor as Evans went out, "alert the staff. If she wants to see the boy, I want to be sure he's not available."

Evans carefully unpressed his face as he neared Sylvia's copter. "O.K. Miss," he said. "The man you'll see is named Jensen. Dr. Stephen Sockertees Jensen, an' he's a tough old bird. You just follow me and I'll take you to him. Just like leading a lamb to slaughter."

"Oh, oh," said Sylvia. "If he's that bad, maybe I'd just better shuffle on back to Buffalo."

"Don't let me scare you," said the guard. He relaxed enough to smile. "He's a real grizzly all right, but never to kids or pretty girls."

"Well, thank you," said Sylvia catching up her things. "Do you think there's any chance he'll hire me?"

"Now don't count on that, Miss," said the guard. "I'm surprised he'll see you at all. We don't get many visitors here. The kids here . . . well, you know . . . we just don't get many visitors."

"But I saw children playing in the meadow as I flew over," Sylvia objected. "Don't they have visitors?"

The guard gave her a shrewd appraisal. "They all ain't crippled that way, Lady." He tapped his temple with a forefinger. "Some of 'em ain't got no moxie up here."

"I thought this was a terminal home," said Sylvia.

"I don't get you," said the guard.

"Well, I thought the children here were . . . well, here for only a short time," said Sylvia. "I thought they were all sick."

"They're all sick all right," the guard answered. "But I get you. Nah, it ain't that. Some of 'em don't last too long, but some of 'em will be here when I'm old and gray." He pointed to the credentials Sylvia was carrying. "We don't need much special training to work here; not according to the doctor. Just so long as we're good with kids, and mean enough to keep the rubbernecks away. Dr. Jensen says there ain't nothing in the world that hurts a sick kid as much as somebody looking at him."

"I like your Dr. Jensen already," said Sylvia. "Irascible or not."

"Like I said," said the guard. "with babes or babies, the doctor don't bite. No, not that way," he headed the girl off from the main entrance. "That's for admissions. The doctor's office is over here."

He led her along a gravel path down the side of a clapboard building, tacked on to the side of the main, brick, building. When they came to a set of low, concrete steps, the guard stepped aside and motioned upward. "Right in there, Lady. Second door on your right. I gotta get back to my post."

Sylvia had trouble opening the

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door. It was a Dutch door, with the bottom half permanently joined to the top. When she finally forced it open, the panes of glass shivered in their casements. Not given to swearing at inanimate objects, Sylvia vented her irritation on the door jamb, stubbing it with her toe.

"Go ahead," said the doctor. He was standing in the doorway to his office, "swear. It won't make your toe feel any better, but it'll make me feel relieved." He walked out and took Sylvia by the arm. "I have a theory," he said. "I'm firmly convinced that all the people who swear at that door will never swear at me, and all the people who don't swear at that door will always swear at me. I call it the 'Double-Dutch' Syndrome."

"Damn," said Sylvia smiling.

"Thank you," the doctor laughed. He led Sylvia into his office and seated her in a school chair at the side of his desk. "Now then, young lady, what can I do for you?"

"You can give me a job," Sylvia answered. She reached over with her left arm and placed her credentials in front of the doctor.

"Now that's a nice direct answer," said the doctor. "I like that. We may do business together." He started to read her papers. "You may smoke if you like," he said, and pushed an ash tray over to her without looking up.

"Thanks, no," said Sylvia. She crossed her hands in her lap and waited for him to speak again.

When he finally finished he looked over at her quizzically. "Is this the first job you've lost for being too good for the position?" he asked.

"I haven't lost my job," said Sylvia, deliberately misunderstanding. "I'm still employed at Buffalo Presbyterian. They know I'm here," she added.

"I wasn't referring to that position, Miss Hahn," said the doctor. "I'm talking about this job."

"Oh?" Sylvia was prepared. "Wait . . . please, doctor. I'm not looking for that kind of money. I'll take seventy-five dollars a week and like it. That's enough to meet all my commitments."

"Stop right there, Miss Hahn," said Dr. Jensen. He smiled gently. "Let me tell you what you were about to say. We have a patient here who used to be one of your . . ."

"The guard . . ." Sylvia began.

"The guard has nothing to do with it," said the doctor. "I've heard, or heard about this story, two or three times a year, every year, since St. Luke was an intern. There seems to be an affinity of sort between sweet, decent young ladies, and handicapped children.

"Now, Miss Hahn, I want you to listen to me carefully." He placed his elbows on the desk and made a tepee of his hands. "And please don't interrupt!" He paused, as though carefully considering what he was going to say. "This is a nursing home for defective children. It

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is not a hospital. I'll repeat that, it is not a hospital! We have only one task here, to make the lives of these children as happy, and as comfortable as we can, for as long as they live. We don't cure them. Now I'll say that again. We don't cure them! And we do not try to cure them. And you, being who and what you are, can not accept that."

"I can try," said Sylvia.

"At what cost to the children?" asked the doctor. "These children are here for help, not to be helped. And there is a difference there!" He held up a warning hand to choke-off her expected flow of words. "Please, Miss Hahn, I've been through this before. Anyone who has ever run a home like this has been through this before. You're sweet and lovely and compassionate . . . and more important, you're full of life. So full of life that you want to share it with others. But these children no longer have the capacity to accept such a gift. The prolongation of life is not always a blessing, and doctors are not always gods. We're not divine here, Miss Hahn, we don't have the power of healing, but we can put an end to suffering. And that is precisely what we do!"

"I. . ." said Sylvia.

"I . . ." said Dr. Jensen interrupting and poking himself in the chest with a finger. "I. I will give you one more reason why I will not hire you. And this will be the definitive reason. We're not loaded here, Miss Hahn. By that, I mean that we don't have a lot of money." He nodded his head sagely as Sylvia inadvertently glanced toward the parking lot. "I'd like to hire you. You keep your eyes open and notice what's going on. You'd be surprised at how many so-called intelligent people don't." He gestured toward the lot. "That's one of our sources of revenue. We have at least one case of every major affliction visited upon children. We sometimes get observers from as far away as the Middle West. But that's an end to it, they observe. These children aren't experimental animals. But they're here in their natural environment, so to speak, and if we can aid research elsewhere we're glad to go along with them. And more important, we charge for the privilege.

"But back to what I was going to say," the doctor continued. "We don't have much money. Most nursing homes don't, and we're probably below average. We charge less than a hundred dollars per month per patient, and as I've said, that is not a lot of money. So we can't pay too much to our help. And this doesn't give us the best help in the world. But it's kind help. And every one is competent. I see to that! Now you might think you'd be willing to work here for a pittance . . . and you might. For a year or so. But where does that leave us? We're only human. Someone as intelligent and well-trained as yourself would

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end up with more and more responsibility. You'd assume more and more authority, and then . . . ? And then you'd be gone, and we'd be left with a hole we couldn't fill.

"Now don't interrupt me!" he said as Sylvia started to protest. "How old are you? Twenty-seven? Twenty-eight? No! I don't think you are." The doctor spread his hands. "It really doesn't matter. The point is, you are not going to work for half-pay for the next ten years. And I can't offer you a raise in the next ten years. And that's an end to that! You are not hired, Miss Hahn."

Sylvia realized that here was the irrevocable, "No!" She did not try to fight it. "You've answered my objections before I could make them," she said ruefully. "All right, doctor, but before I go may I see Tommy Magee?"

The doctor smiled sympathetically. "Is that the name of your ex-patient?"

Sylvia nodded. "I guess you had me pegged right, doctor."

"Well, I don't see why not," said Dr. Jensen. "Let's see." He got up from his desk and walked over to a wooden filing cabinet in the corner. "Tommy Magee," he said. "Magee . . . Magee . . . Maestri . . . Magee! Here we are, Tommy Magee, Ward 3-C. All right, Miss Hahn, I'll take you to him."

He took Sylvia down the corridor of the building they were in and out the back door. As they cut across the angle of the buildings, he asked, "You don't mind the charwoman's approach do you? I like to sneak up on my nurses unannounced, it keeps them on their toes."

"I'll bet it does," said Sylvia lightly.

The doctor led her up an outside fire escape to the third floor of the main building, and then through a fire door and down a scrubbed tile hallway. There were open doors on every side. The rooms appeared to be empty.

"Hey!" called the doctor. He winked at Sylvia. "Hoo! Ha! Ho!"

"*Shush!*" said a gray-haired nurse, darting out of a room down the passageway. "Where do you think . . . Oh! it's you, Dr. Stephen. Well, *shush* anyway."

"*Shush,* yourself," said the doctor. "Mrs. Hinman, this is Miss Hahn. She'd like to see Tommy Magee."

The nurse had started to extend her hand in greeting, but now she stopped. "Oh, I'm sorry my dear." She shook her head negatively. "That just isn't possible."

"What's the matter?" said the doctor quickly. "Is the boy ill?"

"No, no," said the nurse. "He's fine. That's just it." She looked at Sylvia compassionately. "I'm sure you understand."

"But he'll be overjoyed to see me," said Sylvia.

"Will he be overjoyed to see you leave?" Mrs. Hinman asked.

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"Oh come on now, Helen," said Dr. Jensen. "A short visit shouldn't hurt the lad."

"Doctor," said the nurse, "it will do exactly that. I'm sorry, but if you let this young lady see Tommy it will be directly against my best judgment."

The woman turned to Sylvia. "My dear, I know how close you must feel to the boy. I could tell how attached he was to you. For the first two weeks we could hardly get him to talk. Even now, it's only been in the last two or three days that he's been willing to come out of his room and play. And if he should see you again . . . no matter how nice it might be for both of you . . . well, we'd just have to go through it all again. No, really, I'm sorry, but I simply have to forbid it."

Dr. Jensen laid his hand on Sylvia's shoulder. "I'll have to say I'm sorry too, young lady. Looks like this hasn't been much of a trip for you. But I'll have to stand by Mrs. Hinman's judgment."

"I . . . I guess I understand," said Sylvia.

"Well," said the doctor more normally, "just so this won't be a complete waste for you, let me take you down to the kitchen for a cup of coffee."

"No, really," said Sylvia, "that's all right. I do understand. But I think I'm going to push off." She glanced at her watch. "I'd planned on staying the night in town, but if I leave now I can still be home by daylight."

"All right, Miss Hahn," said the doctor. "I'll have Evans show you out. And have him give you a card. If you'll call first, I'm sure we can at least fix up a visit for you and Tommy. After he's become more secure in his new environment, of course."

"Kai," said Sylvia, "I am telling you there is something wrong. And I am not being a silly female. Just wait a minute! It's here somewhere . . ." Sylvia was sitting in the middle of the floor of her apartment, surrounded by paper cartons and dusty books.

Kai was standing off to one side, batting with his hands at dust motes. He was a tall, lean man, one of the unfortunate breed who never seem to be able to wear clothes that fit them. The suit he wore extended down beyond his lab coat. He had not yet taken off his hospital apparel. "For Pete's Sake, Queen Bee, what is this? You get me over here with a female screech, so I think your apartment's on fire, and what do I find? You're combing through your college books like a middle-aged *hausfrau* showing her daughter what her momma's steady used to look like. Let me know when you find your yearbook."

"Oh, shut up, Kai," said Sylvia. "I tell you this is important. Wait until I find it."

"Find what?" Kai asked.

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"A book," said Sylvia, pawing through her books. "A textbook," she said. More pawing. "This textbook!" she said triumphantly. She rose to her feet and handed the book to Kai.

"Intellectual Training for the Physically Handicapped," Kai read aloud. "So? Teach them to use their minds when they can't use their bodies. I'm sure it's a fine book, but it's hardly a classic in the field. It's bound to be out of date, Syl," said Kai with a bewildered expression.

"Don't be stupid!" said Sylvia. "What do you think I gave it to you for, homework? See who wrote it!"

Kai turned to the frontispiece. "Helen Harper Hinman," he read. "What is it with you women? If you don't have three names, do you get read out of the club?"

"Kai," said Sylvia, "don't you see who she is? Now she's a nurse at Sunnyvale."

"Can't she be a nurse at Sunnyvale and write a book?" asked Kai.

"She wasn't a nurse at Sunnyvale when she wrote the book," Sylvia said patiently.

"So?" said Kai.

"I will," said Sylvia, "draw you a diagram!" She went over to Kai and pointed with a finger. "Director of Nursing, Children's Hospital, New York City, New York," she read slowly and distinctly.

"So?" said Kai again.

"So," said Sylvia, "what is the Director of Nursing of one of the largest hospitals in the world doing as a ward nurse in a crummy little nursing home in Boondock, Pennsylvania?"

"I thought you said it was in Canandensis," said Kai.

"This is important," said Sylvia. "It just doesn't make sense."

"What doesn't make sense?" Kai shrugged. "Maybe she got tired of the rat race and decided to settle down."

"Oh stop it, Kai," said Sylvia. "Use that fine Irish mind for something beside sneering."

"All right," said Kai, "I agree with you. It doesn't make sense. Now what?"

"Now I will tell you something else that doesn't make sense," said Sylvia. "Would you hire me for seventy-five dollars a week?"

"You're joking," said Kai.

"No," said Sylvia, "I am not joking. Do you know anyone who wouldn't hire me for seventy-five dollars a week? Even if it were only for one week?"

"I take it," said Kai, "that Sunnyvale did not hire you for seventy-five dollars a week."

"Sunnyvale didn't hire me," said Sylvia. "And I have a funny feeling that he—meaning this Dr. Jensen—wouldn't have hired me at seventy-five cents a week. Oh, he had a nice plausible explanation about longevity and inter-dependence and all that. It even sounded reasonable at the time. But the more I think about it, the more it doesn't ring

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true. With the expected turnover in hospital help? I'm just too good not to hire at that price. No matter how long I work. And I'm not patting myself on the back!"

Kai tilted his head quizzically. "I'll grant you that," he said smiling. "What else?"

"Lots of things," Sylvia said after a pause. "And not little things." She pointed an accusing finger at Kai. "You said you'd never heard of Sunnyvale."

"And I never did," said Kai. "At least not before Tommy." He scratched the bald spot on his head musingly. "No . . . no, I hadn't."

"And neither had I," said Sylvia. "And for three weeks there I thought that nobody else had either. But they've got a parking lot filled with copters and autos. As many copters and autos as you'll find at any major hospital. This Dr. Jensen says they've got 'observers' from as far away as the Middle West to account for it. But how do they hear about Sunnyvale in the Middle West when you and I don't know about it here?"

"Maybe they're specialists," said Kai.

"They are specialists," said Sylvia. "In your specialty! You may not be the greatest doctor in the world, Mordecai Schorin, but you're far from the worst. If these people were that well known, you'd know them. You'd read about them in the professional journals if no where else. That's not advertising, you know. An 'observer' could write about his experiences without permission, and without violating a professional ethic."

Sylvia did not wait for Kai to respond. "And another thing. That guard! He had to ask me what I meant by, 'terminal', but I used the word, 'irascible', and he didn't bat an eye. Playing stupid for an intelligent man is the toughest masquerade in the world."

"Where'd you learn that?" asked Kai.

"I read spy stories," said Sylvia sarcastically. "Come on, Kai, this whole picture is out of focus."

Kai was beginning to get interested in spite of himself. "All right, Queen Bee, you've made your point. I believe you. But what do you think they're doing with these children, melting them down for soap?"

"No," said Sylvia. "That's just it. I think they're probably getting wonderful care. And that's another thing. When I flew out there I saw children in a meadow playing softball. Healthy children."

"Healthy?" said Kai.

"Healthy," said Sylvia nodding her head for emphasis. "The guard said they were mentally retarded, but that's nonsense. Mentally retarded children don't play softball. They play Dodge Ball, or King-of-the-Hill, or Ring-Around-the-Rosey. But that kind of a sophisticated team sport is beyond them."

"Not always," said Kai.

"Always," said Sylvia, "if they're

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so retarded that they have to be committed to a place like Sunnyvale."

"Look, Syl," said Kai. "I'll grant all that you say, but I still don't see your point. If you're not worried about their safety, what are you worried about?"

"I don't know," Sylvia admitted. "I just know there's something here that's not quite right. For instance, it wouldn't be upsetting for me to see Tommy. Some children, Yes, but not Tommy. I know the boy, Kai. He wouldn't go into a blue funk. Not Tommy. He might cry himself to sleep at night, but he'd get up every morning and go on punching. And it wouldn't matter if he woke up in a concentration camp or a summer camp."

"True," said Kai. "Tommy was my kind of people. All right, I'll go kick in the door and make them let you see him."

"Gee," said Sylvia. "Thanks. No, but seriously Kai, didn't you say that you'd heard about this Dr. Jensen?"

"I hear about a lot of doctors," said Kai. "The name is familiar, but I can't honestly say how."

"His name is Stephen Socrates Jensen, if that will help," said Sylvia.

"Socrates Jensen?" said Kai, "Yes!" He frowned. "I'll have to check this out, but if I'm right . . . No! . . . I couldn't be right. This Jensen was a Navy doctor. He brought a man back to life. Brought him back to life, Hell! He put him back together again. The man had a severed spinal cord. Syl, that was one of the major operations that led us to where we are today in transplants." Kai paused and ran a hand through his hair. "What's a neurologist of Jensen's standing doing in a place like Sunnyvale?"

"I don't know," said Sylvia. "Let's find out."

Kai gave a rueful laugh. "Mordecai Schorin," he said, "Doctor of Detection. Now hold on a minute, Syl," he said before Sylvia could object, "I'm with you. But I dropped espionage in my Freshman Year. My cloak and dagger techniques are a bit rusty. Let me give this a little thought."

After too long a silence, Sylvia became exasperated. "Stop thinking," she said. "What's so difficult? All you have to do is go down there and look around. You're a doctor, aren't you?"

"Just go pound on the door and demand to know what's going on," said Kai. "That's a trifle direct, isn't it?"

"Certainly it's direct," said Sylvia. "Who do these people think they are? You're a doctor. They've got no right to keep you out!"

Kai laughed. "Hold it, Queen Bee," he said. "You're always borrowing trouble. They haven't tried to keep me out. And you can't honestly say that they tried to keep you out either. As a matter of fact,

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from all you've told me, they've been nothing but honest and aboveboard."

"Oh, Kai," Sylvia wailed, "how can you say that?"

"Well, weren't they?" said Kai. "Let's be objective. The only thing you have is a nebulous feeling about things 'not being right'. If Jensen and Hinman want to run a nursing home, it's hardly against the law. It may not look right to you and me, but it will seem perfectly natural to anyone else."

"But we have to do something," said Sylvia. "We just can't sit here!"

"We will do something," said Kai, "but charging down there and demanding answers . . . in the name of Truth and Righteousness . . . isn't exactly the way. I thought you read spy stories."

"Oh come on, Kai," said Sylvia, "be reasonable."

"No, you come on, Syl," said Kai in irritation. "You've spent half an hour convincing me that these people are hiding something, and yet you expect me to go galumphing on down there like a middle-aged Jack Armstrong and find out all about it. If . . . now, if mind you . . . if this is the right Helen Harper Hinman, and the right Stephen Socrates Jensen, then you and I are up against a pair of king-sized intellects. I could go down to Sunnyvale and spend a year, and I would see exactly what they wanted me to see. Only that, and not one blessed thing more. I'm good, Syl, I'm very good and getting better, but I'm still not in the same league with Jensen. If he tells me a child has a dycoterotomy of the occipital framis I'll just have to go along with him. Either that, or look blank. I sure as hell can't tell him he's wrong, or accuse him of hiding something."

"Then where do we start?" asked Sylvia.

"Let's play like Alice," said Kai. "Real simple! Let's start at the beginning, go on 'til we come to the end, if we come to the end, and then stop. As far as we're concerned this all began with Tommy Magee, so let's begin with his parents."

"They won't help," said Sylvia bitterly.

"Wait until Dr. Schorin gets hot," said Kai. "Super Sleuth Schorin," he amended. "You're overlooking something. This is a different situation now. You were looking for Tommy before, and that was an indirect insult. No it wasn't, it was a pretty direct insult. It was as though the Magees weren't doing their duty as parents. This time we're only looking for information, because the Magees are the very best parents in the world, and they did exactly the right thing by their little boy, and we want to do the same thing for other parents and other little boys. We'll say, 'won't you please help', and they'll say, 'of course we'll help'."

"They've got to help," said Sylvia.

Kai was quietly seething. Sylvia

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could read the signs. From dinner at the Magees to a near-collision over Erie, Kai had said nothing. But now the volcano within him was due to explode.

They had spent the afternoon at the Magee apartment, but Mr. Magee had not been home. He had been called to Sunnyvale. Nothing overt had been said about operations . . . or about death, but gloom had settled heavily over the entire household. Kai and Sylvia had spent four hours assuring Mrs. Magee that every sign was hopeful, and what a wonderful doctor was Stephen Socrates Jensen.

They were not accomplished liars. They may have convinced Mrs. Magee, but they had not convinced themselves.

"Kai, you're as worried as I am," said Sylvia.

"I am indeed," Kai ground out. "You've got me thinking along the same lines you are, now. There's something not right here. Something very not right."

"You don't think it's a racket?" Sylvia asked.

"Not likely," said Kai. "No, that's not the answer. It wouldn't make good sense. People run rackets for money. They either can't, or don't know how to, make it any other way. Jensen and Hinman can both name their own salaries at any hospital in the country."

"Oh, Kai," said Sylvia. "They couldn't be . . . twisted?"

Kai looked over at her angrily. "That's what has me worried," he admitted. "I was only joking about a dycoterotomy of the framis. Jensen may be a better and more experienced doctor than I am, but that doesn't make me any less competent. I know when an operation can help, Syl. Maybe I won't feel I have the skill to perform it, but I know when an operation is necessary. And in Tommy's case it's a waste of time. It's more than that," he added furiously, "it's criminal! There's more to muscle deterioration than nerve damage. I'm sorry, Syl, I didn't come right out and tell you before, but in Tommy's case there's nothing left to save. He has the will to hang on for four or five more years, but then he'll be gone. His body is shot! From his cuticles to his waste apparatus there is nothing there. There are no wonder drugs to help him. And no miracle operation can give him all new insides." Kai smashed his fist on the dashboard. "There is no way out for Tommy but death. Just one long downhill roll. And I think Jensen is giving him a push."

The anger boiling in Kai finally exploded. He punched the "mike" button on the instrument panel as though it were the end of Jensen's nose. "Buffalo Control! Come in Buffalo Control! Buffalo Control!" He was shouting. "Come in Buffalo Control! Buffalo Control!"

"Hold it!" commanded a voice. "This is Buffalo Control. Identify yourself!"

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"Buffalo Control," said Kai. "Give me manual control."

"I don't care what you want," said the Buffalo operator. "Identify yourself!"

"Sorry," said Kai. "This is New York copter 396MD; copter 396MD. Pilot, Mordecai Schorin; Mordecai Schorin. I am . . ."

"O.K., Doctor," cut-in Buffalo Control. "Sorry if I was a little short. Are you on an emergency?"

"No," said Kai. "Well, yes I am! It's important. Vitally important. I'm on my way to Buffalo, but I've got to get to Canadensis, Pennsylvania as soon as possible. It is important," he stressed again.

"Where are you, Doctor?" asked Buffalo.

"About thirty miles north of Erie," said Kai.

"Speed up a little, Doctor," said Buffalo. "Take your ship up to a hundred and sixty."

Kai advanced the throttle.

"O.K., I've got you now," said the control tower operator. "Hold it a minute." After a pause the operator came back on. "Hang on tight, Doctor. I'm going to put you on the New York-Erie Airway. Can you justify a police or a commercial level?"

"No I can't," said Kai. "Not really." He glanced at Sylvia apologetically. "It's too late now to do anything anyway, Syl, so long as we're there in the morning. If they haven't operated yet, they won't do it before seven tomorrow morning. No, Officer," he said to the mike, "no I can't, but it is important. Can you help us?"

"Sure thing, Doctor," said the operator. "I'm going to call ahead to Wilkes-Barre. You give 'em a call in, say, sixty minutes. An hour from now. They'll pull you out and land you right in downtown Canadensis. Will that do it for you?"

"Yes it will," said Kai. "Thank you, Officer. Thank you very much." Kai punched off the mike and leaned back in his seat. "Well," he said, "now comes the hardest part. Now we wait."

Immersed in thought, both of them sat quietly in the copter cockpit. Passive passengers. To Sylvia, with her compassionate woman's mind, the time spent in waiting was miserable. But to Kai, with the mind and knowledge of a doctor, the waiting time was pure hell. In spite of his admonitions to himself not to borrow trouble, his thoughts became more and more dire.

Sylvia broke the silence. "We should call ahead," she said. "Maybe they won't let us in."

"They'll let me in," Kai said between his teeth. "They'll let me in or I'll kick down the ever-loving, baby blue-eyed door. But that is a good idea. I will call. Where are we now?"

Sylvia turned to the window and looked down. From above, the darkened earth appeared like the heavens on the clearest, star-bright

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night. This was Eastern America, and it was no longer possible to travel two miles in any direction without coming upon human habitation. House lights twinkled everywhere, and here and there, like splotches on a surrealist painting, town signs flashed skyward, proclaiming the existence of the municipalities below. "Buttonwood," said Sylvia.

"What's that near?" asked Kai.

Sylvia looked at the strip-map of the New York-Erie Airway. "Williamsport," she said.

Kai punched the dashboard mike and tripped the switch below it to "Telephone." "Williamsport Long Distance Operator, please," he said.

"Williamsport Information," said a woman's voice. "May I help you?"

"Yes," said Kai. "I wish to place a person to person, closed circuit 'phone call to Dr. Stephen S. Jensen, at the Sunnyvale Nursing Home in Canadensis, Pennsylvania. No! Wait a minute. Cancel that. Make it an open circuit. Just get me the Sunnyvale Nursing Home, station to station. I'll speak to anyone who answers."

Kai waited stoically while the operator made the connection. Twice Sylvia started to say something, but each time he motioned her to silence. "It doesn't matter what they say, it's what I say that . . . Hello? Hello?"

"Sunnyvale," said a man's voice.

"My name is Schorin. Dr. Mordecai Schorin," said Kai. His voice was brittle and he enunciated each word with care. "I am a consulting neurologist at the Buffalo Presbyterian Hospital in Buffalo, New York. I wish to sppeak to Dr. Stephen S. Jensen."

"Hold on, please," said the man. "I'll see if he's still in the building."

Kai could hear the paging system in the background. He raised his eyebrows at Sylvia. "Pretty fancy for a nursing home. Those hounding systems cost a fortune to install, and I can tell from the way he's calling that that one's got video."

The man came back on. "Sorry," he said. "Dr. Jensen doesn't seem to be here."

"Where can I reach him?" asked Kai. "This is important."

"Can't it wait 'til morning?" asked the man.

"I don't stutter, do I?" said Kai. "I said this was important. Now where can I reach him?"

"You can try for him at his home," said the man. "Hang on, I'll get you the number." After a deliberate pause, he asked, "This long distance? O.K., first you dial 1126, then 417-409-683-58142. Got that? Want me to say it again?"

"Yes," said Kai, "I got that. No, I don't want you to say it again. But I do want you to make sure that Dr. Jensen knows I called. And I want this conversation logged."

"Want I should take a message?" asked the man.

"That's right," said Kai. "Please!" It was not a request. "Tell Dr. Jen-

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sen that I wish to see him the first thing tomorrow morning. If he has an operation scheduled, then I wish to see him before the operation. To that effect, I will come to Sunnyvale at seven tomorrow morning. Make a note of that. My name is Schorin. Dr. Mordecai Schorin. I will be at Sunnyvale at seven tomorrow morning."

"You don't need to do that, doctor," said the man. "We . . ."

"I will be at Sunnyvale tomorrow morning at seven," said Kai. "See to it that the people on duty at that time have the message." He hung up.

"Was that Dr. Schorin, or Captain Schorin?" asked Sylvia.

"General admiral Schorin," said Kai. "And if that doesn't get results we'll try President Schorin. I am not a sweet, compassionate young lady, Syl. I am a doctor. I am a mighty irate doctor." He laughed at himself. "And if necessary, I will be a mean, old doctor. But I am going to see Dr. Jensen. And more important, I am going to see Tommy Magee."

He hit the telephone switch on his dashboard again, and tried the number the man had given him. There was no answer. He tried it four more times in the next twenty minutes, each time with the same result. Finally he gave it up and consulted his watch. "Almost ten o'clock, we should be there by now." He flicked off "telephone" and back on to "mike." "Wilkes-Barre Control; Wilkes-Barre Control. This is New York copter 396MD; copter 396MD. Pilot, Mordecai Schorin; Mordecai Schorin. I am flying to Canandensis; that is, Canandensis. Will you give me manual control; may I have manual control?"

"This is Wilkes-Barre Control; Wilkes-Barre Control. We've been expecting you, Doctor. But hold on a few more minutes, please. There's a stream of heavy traffic right under you." After a three-minute pause, Wilkes-Barre came back on. "O.K., Doctor, start reducing your speed. I'm going to put you right down on the deck."

Kai cut power and watched his speed drop from one hundred eighty to one twenty.

"You're still too fast, Doctor," said Wilkes-Barre. "No hurry now, you're almost home. Come down to sixty-five or you'll fly right past it."

Kai cut his power still further, until he was steady on sixty-five.

"Fine. That's just fine. Now hold it there, I'm going to bring you in on top of route 290." There was a pause. "O.K., everything clear. You're doing fine . . . just fine . . . now hold it . . . hold it . . . O.K., Doctor. There you are! Take over, there's not a thing near you. You're right on the outskirts of town," the operator said with professional pride.

The dashboard indicator light flashed yellow as Kai took over con-

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trol. "Thank you, Officer," he said. "I appreciate this."

"Part of the service, Doctor," said the Wilkes-Barre operator. "Hope everything works out all right."

Kai leaned forward in his seat and looked down. "Find us a motel, Syl. I sure don't want to sleep in this copter tonight. Tomorrow we'd both better be bright-eyed and bushy-tailed. I let my temper get control of me, we should have gone on home to Buffalo, and then flown down here early in the morning."

"No," said Sylvia. "This is better. Maybe we can't do anything, but I feel better just being here." She was looking out the window at her side of the road. "There's one. Let down, Kai. There's a motel right over there."

The motel was full. So was the next one. On the third try they located one empty room.

"You take it, Syl," said Kai. "There's bound to be a room at the hotel. I'll leave the copter here and get a cab into town."

"What hotel?" asked Sylvia.

"Don't be a pessimist," said Kai. "There's bound to be a hotel. I'll make out. Go on into bed, Queen Bee. I'll give you a call in the morning before I go out to Sunnyvale."

"You will not," said Sylvia. "You come out and get me before you go out to Sunnyvale."

"It's going to be early," Kai warned. "And there won't be a thing for you to do but wait. Why not stay here. You know I'll keep you posted, and if anything happens . . ."

"If anything happens," said Sylvia, "I'll be ten miles away and you'll be too busy to come and get me. And I'll be too busy fighting with that stupid guard to even know where you are. Oh no you don't," said Sylvia fiercely, "I've come too far and worried too much about this thing to start being reasonable now. We're not talking about my maiden aunt laid up with a broken leg, we're talking about Tommy Magee. And God only knows what's going on up there." She started to gather up her things. "And I don't think you're going into a hotel and go to bed at all. Whatever you're up to, I'm coming with you."

"Now look, Syl," Kai began.

"Don't 'look' me," said Sylvia. "Oh, Kai, you can't shut me out. I don't care how bad it might be."

Kai took her by the shoulders. "I'm not trying to shut you out. Listen, Queen Bee, I want to do some asking around, and you'll only get in the way."

"I'll only get in the way," Sylvia repeated plaintively.

"I don't mean it that way," said Kai. "Listen. Please listen. The only places I can get any information at this time of night are in a police station or a bar. And it's still too early to drag in the police, we only think there's something wrong here, we don't know. And if I take you into a bar it won't be the same thing as

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me going in alone. What I want right now is some plain man-talk with one of the locals. I can do that hunched on a bar stool guzzling beer. I can't do it sitting in a booth with a pretty girl. These people are bound to have some information about Sunnyvale, only I don't want to come straight out and ask for it. That way they'd tell me it was a nursing home or a hospital. What I want are their general impressions. How they feel about it. What the people who run it are like. In a way I'm not sorry that I didn't get Jensen before. I'm not going to try and get him now. Maybe this way I'll have a little more weight under my belt when I hit him." Kai made a fist. "And I might! No, seriously Syl, let me do this my way . . . well . . . wait a minute. You want to help? Fine! Go smile at the motel owner and tell him you're lonesome. Maybe he'll know something. You know, parents staying here, or maybe these observers you mentioned before. Then see if there's a drugstore open in one of these shopping centers. Go in and have a cup of coffee. Maybe the counter girl will know something. Just shop around and see what you can pick up." He smiled at her tenderly. "Information, that is. You aren't going to go to bed anyway, are you, Syl?"

Kai had put his hand on Sylvia's arm, and now she covered it with her own. "Bless you, Kai," she said. "You've given me something to do. If I'm busy I won't have time to fret." She held on to his hand. "But you'll come back, won't you? Please come back."

"As soon as the bars are closed," said Kai. "Then I'll come back and we can chew fingernails together. All right, Queen Bee. Go sleuth."

Evans gazed at the receiver in his hand reproachfully, as though it, and not Kai, had hung up on him. Then, extending his arm, he turned it slowly, like a periscope, until it pointed at Dr. Jensen. "You," he said nodding his head at the receiver, "have a problem. And not being here is not going to solve it."

"Have you found out anything about him," said Evans. He shrugged. "What's to find out. The man's a fine doctor. What else can I tell you? Nothing that's going to help you any, and that's for sure. This Schorin smells a rat, and you're the rat he smells. He's going to bust in here tomorrow morning looking for answers. And you can't feed him the same gobbledy-gook you give to these parents. He won't buy it. How many of us have you told, and how many of us do you just give us back our children and send us on our way? Damn few! This Magee. The man's had no education, and he was so happy to see his boy getting well that he didn't say a word. But he had question marks all over his face. You'll have to tell him before you let him go. You think Magee's any smarter than Schorin?"

Evans got up and thrust his hands

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in his hip pockets. He started to pace. "This is a sharp lad, Stephen. He's spent as much time checking up on you as I have checking him. And you'd better believe that if he had any tracks to hide he hid them better than you did." Evans paused, then added bitterly. "I warned you. I told you this would happen. Maybe not Schorin. Maybe I'm wrong and maybe you can sell him a bill of goods. But if it's not Schorin this time, it'll be somebody else the next. Damn it, Stephen! Why must you have it both ways? Either you go underground and hide completely like I want, or you come out in the open with Senator Gilham leading the interference." He shook his head disgustedly. "But this way you're half-hidden and half-legal, and you want to guess which half they'll find and which half they'll prosecute?"

"We are legal," Dr. Jensen protested.

"We have been legal up to and including getting these kids here. And that's where we stop!"

"But I can perform all necessary medical . . ." Dr. Jensen began.

"Stephen!" Evans interrupted. "The time for your rationalizations is past. We've been arguing about this for three years now, and my side of the argument is knocking at the front door. Don't you realize what this doctor can do to us? Not this doctor, any doctor! And he doesn't have to take you any higher than a county board. Don't you know what a good lawyer could do to us in court?" He thumped himself on the chest. "Do you know what I could do to us in a newspaper?" He stopped pacing long enough to pour himself a cup of coffee, then went on determinedly. "It doesn't matter who does what to us where. Or why. The minute anyone takes the first step the others will follow logically. Legally!" he added for emphasis.

"Then what do we do, Philip?" Mrs. Hinman asked. The gray-haired nurse had slipped in unobtrusively during the argument. She walked deliberately over to the coffee pot and fixed a cup. "Ush! This stuff must have been brewing since breakfast. Why don't you two make coffee instead of speeches." She came over to the switchboard and sat on the edge of the desk. "Without a declamation, what do we do?"

"We punt," said Evans in disgust.

"The voice of reason," said Dr. Jensen bitterly.

"Crying in the wilderness," said Mrs. Hinman with unexpected sarcasm. "You two aren't accomplishing anything. Philip is screaming 'I told you so'. And you're acting like a little boy who forgot to mow the lawn. Excuses don't get the job done. And neither do accusations," she said to Evans. "What can we do now?"

Evans shrugged. "We talk to the man."

"Without knowing anything about him?" Dr. Jensen protested. "Without preparing him first?"

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"He's prepared himself," said Evans. He took a sip of his coffee. "Of course, I could always kill him."

"Philip!" said Mrs. Hinman.

Evans turned to her. "One or the other," he said. "It's as simple as that. We can't fool this man. And if I know anything at all about people, we can't stall him. But you're right. I can't kill him. It's too late for that. He's been writing and calling all over the country about Stephen here, and if anything happened to him now, this is where they'd start to look. You've got a fan yourself, Helen," he added.

"I know," said Mrs. Hinman. "Sylvia Hahn. My friends have been writing to me because she has written to them. My publisher, my banker, my school, I think she's contacted everyone who ever knew me. It's a shame," she smiled sadly, "I think I might have gotten to like the girl, but I don't think she's going to care much for me."

"But can't we still try my way first," said Dr. Jensen.

"No," said Evans. "That's out. I've investigated this man as thoroughly as I could without arousing suspicion. I've investigated both of them thoroughly. I can't tell you how they think or feel, but I can tell you where they stand in medicine. Right up at the top. They're both expert in their fields. You can't carry this deception any further."

"But we don't even know what they want," Dr. Jensen said plaintively.

"Plumbers should be plumbers," said Evans with the patience born of exasperation, "as salesmen they ain't. I know what they want, if you don't. They want information. They want to know what is going on down here. They want to see Tommy Magee. And you," he said pointing his finger and speaking in cadence, "are going . . . to show them . . . Tommy Magee. If you don't we're already dead." Evans cocked his head to one side. "Now I'm not a lawyer, Stephen. I don't know what Schorin can do if you don't let him see Tommy. But, if you don't let him see, Tommy we are sure going to find out what he can do.

"Local police, county police, county medical society, what does it matter? Once any one of them comes in here, they're all in here. So you might as well get it done. You have to tell Schorin the truth. You have to gamble."

"But why should they go to the police?" Dr. Jensen asked. "The boy has had a major operation. It's perfectly natural to keep him in isolation."

Evans threw up his hands. "How can such a brilliant doctor be such an utter fool!" He looked hard at Dr. Jensen. "You're beginning to surprise me, once you get out of your own field, you're about as effective as . . ."

"Philip! . . . Stephen!" Mrs. Hinman cried.

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Evans nodded his head. "Sorry," he said. "I apologize. But Stephen, you're thinking exclusively in terms of your own reference. Now think like an ordinary doctor. This doctor. Barring your own special techniques, what possible operation could you have performed on the boy?"

Dr. Jensen concentrated soberly. "None," he finally admitted.

"What about Senator Gilham?" Mrs. Hinman suggested.

Evans hit himself in the forehead with the palm of his hand. "I'm the idea man," he said disgustedly. "I should have brought the senator in on this the minute Schorin started getting nosy. But I just didn't think he'd act this fast." He snorted. "I'm doing what I accused Stephen of, I'm thinking in terms of my own abilities." He saluted Mrs. Hinman with a finger and turned to the switchboard. "If nothing else, the senator deserves a chance to defend himself . . . by disappearing. We all do, we all deserve a chance to hide. Or a chance to possibly talk this Schorin into our way of thinking."

He started to dial. "Why don't you two go to bed. I'll be on this telephone for the rest of the night. And Stephen . . ." Dr. Jensen stopped. Evans reached out and clasped his hand. "Don't blame yourself for this. We all came into this with our eyes open. You're the only dedicated one in the group. The rest of us have children."

Kai stepped out of the bathroom toweling his hair dry. "Do me a favor, Syl. Pour my coffee into a glass, I can't stomach that plastic taste."

The plastic cups were tasteless, but Sylvia humored him. She stripped the wax paper from two of the motel glasses and filled them with coffee then sat down and took a sip of hers. "Pfaugh!" she said. "If they planted me now I'd grow red berries."

"Too much coffee?" Kai asked sympathetically.

"Much too much," said Sylvia. "Much beer?"

"Not enough," said Kai, but without a lightening grin. He shrugged into his shirt. "That's enough small talk. I'm sorry, Syl, I don't mean to be short, but I'm too edgy to be pleasant." He shook his head ruefully. "That shower sobered me up . . . not that I was drunk, but I spent four hours enjoying myself and didn't learn a blessed thing. How about you? Did you find out anything?"

Sylvia assumed a puzzled expression. "I don't know," she said. "It wasn't that I couldn't get them to talk about it." She frowned. "It was . . . well . . . it was as though we weren't talking about the same place. I asked about the Sunnyvale Nursing Home, and they told me about the Sunnyvale School. They think the 'Doctor' in front of Jensen's name means a PH.D."

"I know what you mean," said

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Kai. "Exactly what you mean! But what about the rest of it? The observers? The parents? That sort of thing?"

"Same song sing over," said Sylvia. She put her coffee cup down and leaned back on the bed. "They don't seem to have any contact with parents or visitors, at least this motel doesn't. They have never had a guest from Sunnyvale. But they don't see anything mysterious or out of the way about it. They think Sunnyvale's a rich school. Some place where well-heeled parents get free of their children. Some of them think it's awful, and some of them think it's wonderful and wish they could afford it themselves."

"What about children or hospital personnel?" asked Kai. "Don't any of them ever come into town?"

"No," said Sylvia. "Well, yes, but it's not the same thing. And it puzzles me. Some of these children go home." She nodded her head affirmatively to give emphasis to her words. "Some of these children go home! Usually with their parents, . . . but sometimes alone. And when they go they often stop and buy toys or clothes locally. And always with a grin from ear to ear. The girl who told me this works at the copter terminal, and she said 'how heartwarming it was to see families get back together again . . . where they belong'. She was one of those who think it's a rich school, and all rich people are unhappy. Does any of this sound right to you?"

"Nothing sounds right to me," said Kai.

"Nothing sounds right to me either," said Sylvia. "But I mean the children going home, and the 'happy family' routine. When children come to a place like Sunnyvale, they come to stay. Everyone concerned has abandoned hope. And if they go home, it's usually to die. Nobody's ever happy about it."

"No, nobody ever is," said Kai. He ran his hand ruminatively over his chin.

"Well?" said Sylvia.

"Well?" said Kai. He shrugged. "We may as well have talked to the same people. They think Sunnyvale's a private school. But the taxi driver who drove me into town has never driven anyone out there. He thinks that's a little strange, but not enough to concern him much. He figures the other cab companies got the business. He's had two fares going away; one was a family, and one was a six year old girl with a tag around her neck. He thought that was wonderful, a little girl traveling across the country alone like that. It seems her mother was having a baby, and her father was some lord high muckety-muck in South America, and too busy to come and pick her up. He drove her into Philadelphia and turned her over to a stewardess on one of the trans-world flights."

"Where does that leave us?" Sylvia asked.

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"It leaves me about that far away from murder," said Kai. He held up his thumb and forefinger pressed closely together.

"Why?" asked Sylvia mildly. "Whatever it is they're doing out there, it seems to be beneficial. I don't feel the same way about all this as when I started."

"I know you don't," said Kai. "And it's ironical, because now I feel exactly the way you did at first. This whole thing stinks." He started to pace. "I mean it, Syl. This whole thing stinks! And there's no better way to put it."

"How?" said Sylvia frowning. "You can't fool a whole town. There are too many happy children out there for this to be a . . ." She groped for words. "Jensen is no Baron de Sade. I think we've pretty well established the fact that these children aren't being mistreated."

"Mistreated?" said Kai. "They're receiving the finest medical care in the world. Don't you get it? Don't you understand what he's doing?" His lips thinned under the pressure of his emotions. "If Jensen were a mountebank I could understand him. I'd step on him, but I could understand him. If he were psychotic I could even feel sorry for him. But this way . . . this way I could kill him and only regret it wasn't done sooner. This is so much worse than any of the possibilities we've discussed before."

"What's worse?" asked Sylvia. "If he's not a crook or a maniac, what's worse?"

"Being a brilliant doctor, that's worse," said Kai. "Being a brilliant, greedy, rotten, no-good, money-grubbing doctor! That's worse!"

Sylvia wrinkled her forehead in bewilderment. "I still don't understand."

"Somehow," said Kai, "some way, Jensen has perfected a technique, a treatment, to make hopeless cases well again. Somehow he's found a way to cure the mentally retarded and the physically handicapped. And he's keeping it to himself. He's selling it to the highest bidder when it belongs to the world! He's lining his greasy pockets with the misery born of despair. And I think I'm going to kill him for it!"

"Now you just hold on for a minute, Dr. Schorin! And stop playing boy avenger, you're not the type. Maybe I don't understand what's going on, but what you just said doesn't make any more sense than anything else we've talked about. What about Tommy Magee? Jensen's certainly not getting rich on him."

Kai was still wrapped in the fury of his own emotion and did not seem to hear her.

"What about Tommy?" Sylvia asked again. "The Magees don't have that kind of money."

"They don't have to have that kind of money," said Kai. "They have Tommy."

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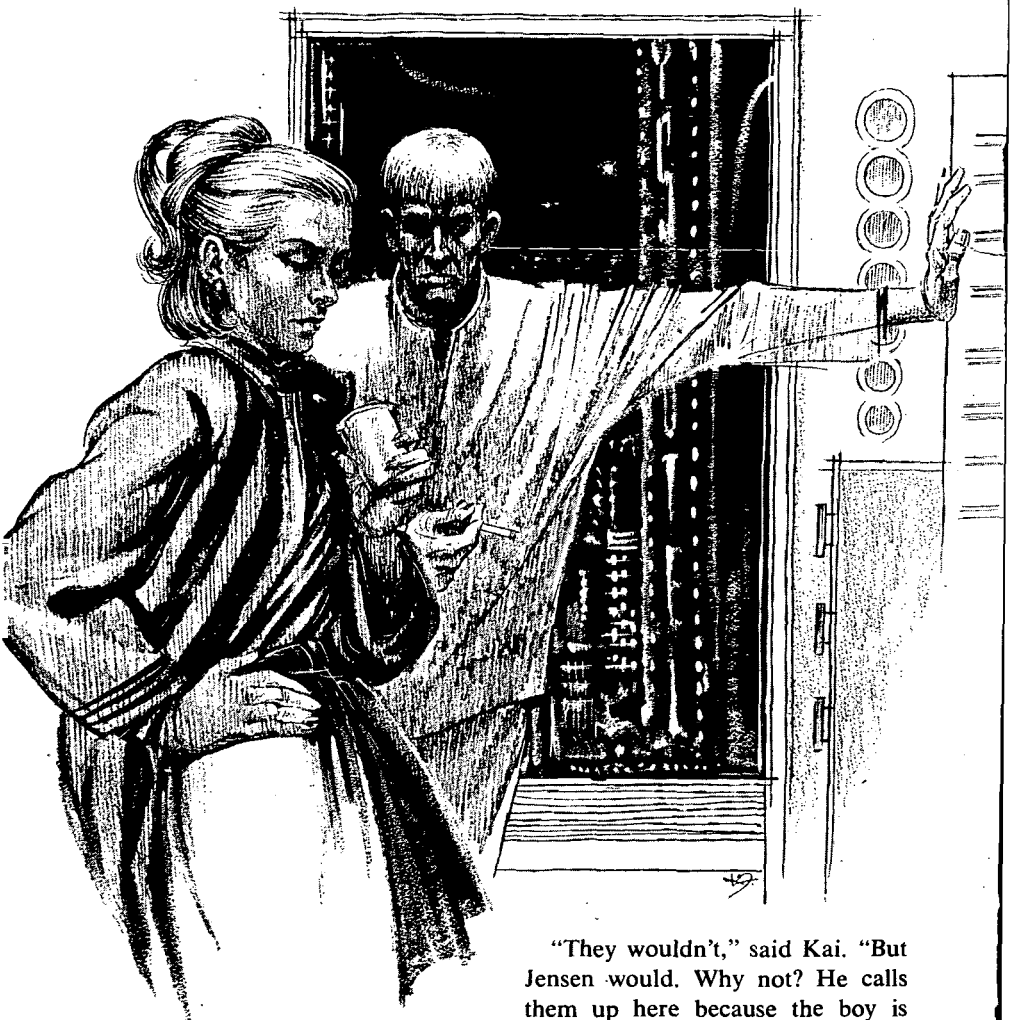

"Kai!" said Sylvia in outrage. She was shocked. "That's an awful thing to say. I admit I called Mr. Magee callous, but that was before I knew the whole story. You certainly don't think they'd be willing to sell their child?"

"They wouldn't," said Kai. "But Jensen would. Why not? He calls them up here because the boy is dying . . . and then he tells them Tommy is dead. What could be more natural? They expect it. And after they get over that first quick flush of sorrow, they'll be relieved. They'll feel guilty about it, but they'll be relieved. And nine

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chances out of ten, when Jensen offers to bury the body . . . in a sealed casket, of course . . . they'll agree. So they'll bow their heads and go home and lead a normal life. And that leaves Jensen with a healthy, intelligent eight year old boy! I wonder what the market price is on a Tommy Magee?" he said bitterly.

"Not enough to interest a doctor who has the world by the tail," said Sylvia evenly. "If he's one half as brilliant as you're giving him credit for he certainly wouldn't risk losing everything for one underhanded deal. It couldn't possibly bring him enough to chance it."

"Why not?" said Kai. "He might take one chance."

"Small time crooks take one chance," said Sylvia. "And the third or fourth 'one chance' puts them in jail. Whatever else he is, this Jensen is no small-time crook."

"That I'll give him credit for," said Kai. "He's not a small-time anything."

"He's not that big-time either," said Sylvia. "You're turning the man into a miracle worker. You say he's curing the mentally retarded. All right, which type? Brain damage? Congenital defect? Birth defect? Disease? He can't cure them all with the same magic ointment, you know. Or you should know," she added reprovingly. "And how about the physically handi . . ."

"I know, I know," Kai admitted. "Physical. Mental. Even emotional. They all have to be attacked from different directions." Kai arched his spine and started massaging the back of his neck with both hands. "I'm pooped. I guess I went off a little half-cocked, but, Syl, this thing has me going. We seem to know even less now than when we started."

"There's one thing we do know," said Sylvia. "We know that apparently hopeless children are going into Sunnyvale, and apparently healthy children are coming out. We don't know how, or why, but at least we know that much. Let's leave it at that. Let's go out to Sunnyvale tomorrow morning without a chip on our shoulders."

"Sorry," said Kai. "You can be objective if you want, but my chips stay right where I put them, smack on both shoulders. I'll give this much, I won't accuse Jensen of anything until I meet him. But this much is clear; Jensen has something out there that is medically good, and whatever is medically good belongs to all of us, and not to a chosen few."

Evans met them in the parking lot when Kai and Sylvia flew out the next morning. The lot was as Sylvia remembered it, full of copters and autos, but Evans was not. He was no longer a slovenly, unpressed guard. He was well-dressed, alert, and polite. He was almost friendly, and Sylvia was

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puzzled by it. Kai was not. Evans' friendliness was that of the beaten professional toward his enemy; acceptance without rancor . . . and without loss of pride.

"Miss Hahn," said Evans. "Dr. Schorin." He nodded his head in greeting. "My name is Evans. Philip H. Evans. Late of the International News Alliance."

"I don't think I remember you from before," said Sylvia deliberately.

"I do make a lousy guard," Evans acknowledged. He extended his hand. "Dr. Schorin, I'm pleased to meet you."

"No," said Kai shaking his head grimly, "you're not." He did not take the proffered hand. "And I am not pleased to meet you." He studied the man insultingly. "I think you've decided to come out from beneath your rock and tell us what's going on. And I tell you beforehand, I'm not going to like what's going on."

Evans wasted no more time on amenities. He spun on his heel and led the way to the home.

Sylvia put her hand on Kai's arm, seeking support, but he shook her off. "No," he said forcefully, "let them be afraid."

Evans strode purposefully across the parking lot. His pace was brisk, as though he had a great deal to accomplish and this was an incidental chore to be gotten done with quickly. He spoke over his shoulder. "You thought we were a racket at first, didn't you?" He did not wait for an answer. "But that didn't make sense, so you threw that out."

Kai said nothing.

"Then," said Evans, "you figured that Dr. Jensen and Mrs. Hinman were too important for a place like this—that is, under normal conditions. So you thought about abnormality. That one still bothers you." He turned his head slowly and deliberately. "The place is crammed with happy children, but that still bothers you." He shrugged his shoulders.

Kai maintained his silence.

"And finally," said Evans, "You thought . . . you think that Dr. Jensen has come up with a wonder cure. Something special that he's withholding from the human race for his own personal profit."

They had come to the main admissions building. Evans stopped and turned to face Kai. "That doesn't make sense either. My boy was here and I've never been a millionaire. I made twenty-four thousand a year as a correspondent, and half of that went for expenses. But I still cleared more than the Magees do now." He stepped back and pointed to a freshly lettered sign taped to the side of the entrance way. "I painted that this morning, Doctor. About an hour ago. I'm going to have it cast in bronze and set right over the threshold." He pushed open the door and waited for Kai and Sylvia to enter. "That's

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your thought for the day, Doctor. Now I'm going to show you Tommy Magee."

The sign said:
TO MEN A MAN IS BUT A MIND
WHO CARES
WHAT FACE HE CARRIES
OR WHAT FORM
HE WEARS

Ambros Bierce

Kai and Sylvia exchanged glances. Once again Sylvia started to speak, but Kai frowned her to silence. His face mirrored his thoughts; perplexity was beginning to replace anger. He took Sylvia by the arm and guided her into the building.

Evans said not another word, he simply motioned for them to follow. He walked into a small self-service elevator to the left of the admissions desk and pressed the "up" button. They waited in silence as the car rose to the third floor. When the door opened automatically, Mrs. Hinman was waiting for them.

"Miss Hahn," she said. "Dr. Schorin." She did not make the mistake that Evans had, and attempt a normal greeting, "I am Helen Harper Hinman." She nodded perfunctorily and continued, "Please follow me." She took them down the same scrubbed tile hallway that Sylvia had been in before. To left and right, doors were ajar, but they were not as empty as they had seemed on Sylvia's first visit. Each had its own murmur of activity, accompanied by the tinkle of silverware on china, and the occasional voice of an adult coaxing. "One more bite."

Mrs. Hinman led them into the Nurse's Station halfway down the corridor. She motioned for them to be seated. Four chairs had been carefully placed behind the desk facing the hallway. The wall in front of the desk was inset with viewing screens. There were thirty-four of them, extending from the ceiling down to the top of the window in front of the desk, and then down both sides of the window, past the desk, almost to the floor. Each was carefully labeled with a room number. Mrs. Hinman leaned over the desk to the console mounted on the back and flicked the switch marked "3-C". Then she sat down on the end chair beside Sylvia and waited while the screen adjusted itself.

"I assure you," said Mrs. Hinman distantly. "that the child you are about to see is Tommy Magee. I prefer to do it this way since I have just given the children their trays and I do not want them disturbed, especially while they're eating. But, if you do not believe me, I will take you to Tommy's room. It's right down at the end of the hall, the second door on the left. This will do him irreparable harm, but since you seem convinced that Dr. Jensen and I have done noth-

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ing but harm to begin with . . ."

Sylvia said, "Please, Mrs. Hinman, we don't . . ."

Kai interrupted. "Hold it, Syl!" He leaned forward in his chair and spoke directly to the gray-haired nurse. His voice was not pleasant. "Let's not start this on the wrong foot. If you pulled that 'Injured Annie' routine in my hospital I'd have you washing bedpans for a week. You may have something to apologize for . . . we don't! We'll believe you for the moment since that . . ."

"Kai!"

Sylvia pointed to the screen.

Kai glanced up. First in irritation. And then in wonder.

On the screen, a small boy, in the manner of small boys, was playing with his food. He sat in a child-sized chair at a child-sized table placed in the center of the room.

The table was not indented.

The chair was not a wheelchair.

There was an adult with him, but momentarily her attention was diverted, and the boy was taking advantage of this and finding out how catapults did not work. He put an orange on the handle of his fork and then hit the tines sharply. The results were as expected; two dull thuds. The first when his fist hit the tines of the fork, the second when the orange rolled sluggishly off the table and dropped to the floor. The sounds focused the adult's attention back on her charge. She smiled, an amused and tolerant smile. "Oranges are for eating," she said, "not for putting in orbit. Pick it up, Clumsy."

The child grinned sheepishly and bent to pick it up.

The grin on the face of the child brought Sylvia out of her shock. "Kai," she said. "Oh, Kai . . . it's Tommy."

The face of the child on the screen assumed an expression of concentration that tore at Sylvia's heart. His arm reached out and his groping fingers missed the orange by six inches.

"Don't cry, Tommy," said Sylvia.

Tommy did not cry.

His concentration sharpened. His actions were awkward and sluggish, but it was not as though his body would not obey, it was as though it would not do anything it was not specifically directed to do. The child's arm lifted and swung over the orange, it dropped, and this time the groping fingers found the orange and closed around it. He picked it up and placed it on the table. Then he looked triumphantly at the woman.

"Hoo," said the woman sarcastically, "ray. You're supposed to eat that orange, not play with it. Peel, Sonny Boy, Peel!"

Tommy grasped the orange firmly in one hand and tried to peel it with the other. His grip was not firm enough and the orange skittered in his hand. He took a fresh

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grip and attacked it again. The orange would not co-operate.

Sylvia gripped the arms of her chair and tried to rise. "Why doesn't she help him," she cried.

Almost absently Kai reached out and pulled her down. His gaze remained riveted to the screen.

"My wife knows what she's doing," said Evans reassuringly. He leaned forward and spoke directly to Sylvia. "This is the fourth boy she's put back on his feet. You've done essentially the same thing yourself, Miss Hahn. Watch!"

Carefully the little boy put the orange to his mouth and bit a piece from the top. With the opening thus made in the skin, he peeled it quickly.

The woman, who had been waiting stoically, pounced. She took the orange from his hand and broke it into sections. Then she put the tip of one section between her teeth, puffed out her cheeks, and thrust her face close to Tommy Magee. The little boy caught the idea immediately and took the piece between his own teeth. The woman let go, smiled, and made chomping motions with her jaws. The boy made chomping motions of his own, but his giggles got in the way of his chomps, and juice ran down the corners of his mouth. Both of them laughed aloud, and the woman said, "It tastes better when you do it your own self."

Tommy nodded his head enthusiastically.

Mrs. Hinman quietly arose and turned off the set. "That's enough for now," she said. "Later you can watch as much as you please. Right now the others are waiting for us."

Kai was the last to stand, and he stood up abstractedly. He seemed like a man in a trance. His eyes were still glued to the now empty screen. He moved sluggishly to his right, bumping into Evans.

"Kai?" said Sylvia.

He did not answer.

"Kai?" said Sylvia pulling at his arm.

There was no response.

"Kai!" Sylvia cried.

"I think," said Kai distantly. "that there is a ring around Tommy's neck. I think I could see it on the screen. I think there is a ring around Tommy's neck."

"Kai?" said Sylvia uncertainly.

Kai looked through her. "I think if I examine the boy I'll find a ring around his neck. A rosy . . . red . . . ring."

"Doctor," said Mrs. Hinman, "if you'll come with me now, you'll have everything explained."

"Ring . . . around . . . the rosy," said Kai in an utterly flat voice. His expression did not change, but he seemed to come out of his trance. He lowered his head slowly and looked over at Mrs. Hinman.

"Doctor," said the nurse, "everything will be explained."

"And I will be convinced," said Kai. His face was still unchanged,

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but the flat quality was gone from his voice. "It will have to be very, very good, and I will have to think about it for a long, long time. But I will be convinced."

Mrs. Hinman and Evans exchanged glances. "I told you he was good," said Evans. He pointed out the door. "Lead on. Let's get this done while there is still something the good doctor needs to have explained."

Kai stopped them as they started down the hall. "Where do you get the . . . parts?" he asked.

"Kai?" said Sylvia.

"Not now!" said Kai rudely. "Where?" he demanded of Evans. Once again Evans and Mrs. Hinman exchanged glances. Evans slowly nodded his head affirmatively, but Mrs. Hinman said, "Doctor, if you'll only come to the meeting . . ."

"No!" said Evans. "No. I'll tell him." His eyes met Kai's on an even level. He ran his tongue over his lower lip and paused to consider his answer. "Doctor," said Evans exhaling slowly, "at the same time that Tommy Magee came to this hospital . . . and it's a hospital, not a home . . . at the same time I brought in a boy named Harry Carmichael. He did not know his name was Harry Carmichael, but that was . . . is . . . his name. And, I had the parents' permission. I promised them only that he would be happy and well cared for. Not that they gave a damn, you understand, but that's what I promised. And we have lived up to that promise."

He paused again, considering, and then went on with his narrative. Slowly. Painfully. He was agonizing over every word. "This was a coincidence, you understand. We take these children as we find them. We don't have a timetable to operate by, sometimes the search goes on for months. You don't really need this explained, but, in the first place, most handicapped children aren't doomed, as Tommy was. And in the second place, the vast majority of mentally deficient children are physically deficient as well. Harry just happened to coincide with Tommy. I'm going to show you the boy right now. But I'll tell you something about him on the way." He paused, and then began again almost belligerently.

"Terms are pretty meaningless when you're discussing cases like this. Imbecile, idiot, moron, even genius, they're all only arbitrary gradations of intelligence. At least, idiot, moron, and genius are, an imbecile has no intelligence. Nor do the lower levels of idiots. Now I for one am not going to put a value judgment on these people, I am not going to say who is the superior person . . . or happier, or more important, or who should have more rights . . . the intelligent or the unintelligent. But this I can tell you, past a certain point, when there is no intelligence, and no

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awareness of self, then there is no person."

They had come up to where Sylvia and Mrs. Hinman were waiting. Mrs. Hinman opened a door and stepped aside for Kai and Evans to enter. Then she took Sylvia by the hand and led her in after them. An attractive young woman, who was playing with a small boy, looked up as they entered. "That," said Mrs. Hinman, "is a Sylvia Hahn. Her name is Esther Jacoby." She introduced Esther to the group.

On the floor, the little boy played away happily, unaware of the intrusion of the adults. He was building a castle with blocks half again as large as his hands.

"This is Harry Carmichael," said Evans. "If it's necessary, I can show you pictures of the boy, and where and how he lived before. But I can tell you all you need to know. This boy used to have a body that worked perfectly, and he was scarcely aware of it. Now he does not have a body that works perfectly, and he is scarcely aware of it. That we have taken away from him." He paused and made a sweeping gesture that indicated the whole room . . . the whole hospital; the woman before them, himself, his wife above, and Mrs. Hinman. "This is what we have given him in return. Love and understanding and constant attention. And this he is more than a little aware of because he never had it before. Good food to eat, warm clothes to wear, and toys he can understand to play with. And most important of all. Someone to care."

Evans stopped and gestured to Harry Carmichael. "Now I don't say this boy will live a longer life because of us. But it won't be any shorter! We have taken nothing away from him in that sense. He's still a complete person, with what, for him, would be a normal life span. Doctor, you know the length of life allotted to imbeciles. It's pathetically short! And we wish that we could do something about it, but we can't. Without a mind to care for it, the body will not hold on to life. But, at least in Harry's case, it will be a happier life. And far more meaningful. As far as I'm concerned, I've just said all that there is to say. I've shown you two boys; Tommy Magee, who now has the world before him; and Harry Carmichael, who has, in different measure, exactly what he had before. Half a loaf isn't always better than none. Not when you can have two complete loaves. Maybe Tommy is Whole Wheat and the other fellow White, but they're both complete loaves, and they weren't before. And, as far as we can see, they are both better off because of what has been done."

"Now I'll take you to the meeting, Doctor, and you can argue to your heart's content about religion,

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and ethics, and economics, and morals, and everything else that enters into it. But as I've said, as far as I am concerned, there is nothing else to say!"

"There doesn't seem to be," said Kai blandly. He stepped over and took Sylvia by the arm, and then nodded to Evans. Evans nodded in turn. Then, taking Mrs. Hinman by the arm, he led the way down the hall. Sylvia looked questioningly at Kai. Kai squeezed her arm reassuringly, "Come on, Queen Bee," he said. "Let's go be convinced."

It was the Rangers against the Panthers, and the Panthers were at bat.

"Tommy," said Tommy-Eyes, *"a five and one quarter inch spheroid is traveling toward us at a speed of ninety-six point eight feet per second, in a series of arcs, beginning at a point . . ."*

"Don't bother," said Tommy-Brain. *"Tommy just threw the runner out at first."* ■

IN TIMES TO COME

Next month begins Mack Reynolds new novel, "Space Pioneer". Sorta obvious what it's about—but this particular pioneer got there slightly by mistake. He was a sort of innocent bystander really—just an assassin on an assignment—when he found he had to follow his target into this spaceship. What made it tough for him was that all he had was a name, didn't know whether his target was male, female, young, old, or what.

But he did find it took assassin talents to stay alive in the bucket of bolts (with threads stripped!) that was supposed to be the new-colony ship, and was, in fact, a plan for all-out looting!

It's an unusual story in another way, too. You find out who the assassin isn't *fairly quickly—but you won't find out till next month who he* is. *And naturally, in such a mix-up, you won't find out who his target is—beyond a name—until the third and last installment!*

THE EDITOR.

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"Positive Feedback" is an engineer's way of expressing what a mathematician calls a "divergent exponential series." But engineers can't handle Infinity . . .

POSITIVE FEEDBACK

CHRISTOPHER ANVIL

SCHRAMM'S GARAGE

To: Jack W. Bailey
413 Crescent Drive
City

Parts: 1 set 22-638 brushes $1.18
Labor: overhaul generator
set regulator
clean battery terminals $11.00
total $12.18

Note: Time for oil change and install new filter.

Noticed car seemed to pull to the left when we stepped on the brake.

Can take care of it Wednesday if you want.

Joe Schramm

Dear Joe:

Check for $12.18 enclosed.

Will see about the oil change and filter later. The kids have been sick and we're going broke at this rate.

Maybe it pulls to the left, but I haven't noticed it.

Jack Bailey

SUPERDEE EQUIPMENT

Mr. Joseph Schramm
Schramm's Garage
1428 West Ave.
Crescent City

Dear Mr. Schramm:

Enclosed find literature on our new Automated Car Service Handling Machine.

With this great new machine, you can service anything from a little imported car to a big truck. The Handling Machine just picks the vehicle up, and the Glider on its Universal Arm enables your mechanic to get at any part, from above or below. By just turning a few knobs, he glides right to the spot on the end of the Arm. Power grapples, twisters, engine-lifters, transmission-holders, dozen-armed grippers and wrasslers—all these make the toughest job easy.

If you've got a dozen mechanics, buy this machine and you can get along with three or four.

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This machine will be the best buy of your life.

Truly yours,
G. Wrattan
Sales Manager

SCHRAMM'S GARAGE

Dear Mr. Wrattan:

This machine of yours would take up my whole shop. It's all-electric, and looks to me as if it would take the Government to pay the electric bills. Your idea that I could buy this thing and then let most of my mechanics go is a little dull. When business gets bad, I can *always* let them go. But with this monster machine of yours, I couldn't let *anybody* go, except the few guys I still had, who would be my best mechanics.

Do you know how hard it is to find a good mechanic?

Let's have the prices and information on your line of hydraulic jacks. Spare me the million-dollar-Robot-Garage stuff.

Yours truly,
J. Schramm

SUPERDEE EQUIPMENT

Mr. Joseph Schramm
Schramm's Garage
1428 West Ave.
Crescent City

Dear Mr. Schramm:

Enclosed find prices and literature on our complete line of hydraulic jacks, jack-stands, and lifts.

Mr. Schramm, we feel that you do not fully appreciate the advantages of our great new Automated Car Service Handling Machine. This machine will more than pay for itself in speed, efficiency, and economical service. In bad times you could still cut down your repair staff. Mr. Schramm, *one man* can operate this machine.

We are enclosing a new brochure on this wonderful new labor- and expense-saving machine, which will turn your garage into an ultramodern Servicatorium.

Cordially,
G. Wrattan
Sales Manager

SCHRAMM'S GARAGE

Dear Mr.Wrattan:

I'm enclosing an order sheet for jack and stands.

Your new brochure on your wonderful new labor- and expense-saving machine went straight into the furnace.

I think you are going to have plenty of trouble selling this machine. The reason is, all you're doing is to think how nice it will be for you if somebody buys it, not how lousy it will be for him to have the thing.

This machine will take cable as thick as my arm for the juice to run all those motors. It's bound to break down, and while I'm repairing it, I'm out of business.

You say I can let all my mechanics go but one. You must have a loose ground somewhere. If I fire all my mechanics but one, and he runs this machine, *who's the boss then?*

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Illustrated by Kelly Freas

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I could tell you what to do with this great new machine of yours, but I don't think you would do it.

Yours truly,
J. Schramm

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. W. Sanson, Pres.
Dear Mr. Sanson:

I am sending up a large envelope containing sample letters, from garages all over the country.

The response we've had on Handling Machines has been unusually large and emphatic, but unfortunately it has not been favorable.

G. Wrattan

SUPERDEE EQUIPMENT
Interoffice Memo

To: G. Wrattan, Sales Mgr.
Dear Wrattan:

There are going to have to be some drastic changes around here.

Bring all the letters you have up to my office at once.

Sanson

SUPERDEE EQUIPMENT

Mr. Joseph Schramm
Schramm's Garage
1428 West Ave.
Crescent City
Dear Mr. Schramm:

There have been big changes at Superdee! Exciting changes!

Following a complete overhaul of top engineering management personnel, things are moving again!

Superdee is on the march!

Leading the van is our revamped ultramodern Supramatic Car Service Handling Machine, capable of repairing anything from a little foreign car to a huge truck! Fast! Economical! Efficient!

This new version embodies the most advanced methods, together with the actual suggestions of *practical automative repairmen like yourself!*

This machine is hydraulically operated, and even has a special High Efficiency Whirlamatic Hand Pump in case of emergency power failure!

There's practicality!

There's real manufacturer co-operation!

You asked for it! *Here it is!*

Superdee is on the march!

Are you?

Cordially,
G. Wrattan
Sales Mgr.

SCHRAMM'S GARAGE

Dear Mr. Wrattan:

I am enclosing an order for one of your new Superdeeluxe jacks.

I have read the stuff about your new Supramatic Machine. This one doesn't take as much space, and seems to be pretty good.

But I can't afford it.

Yours truly,
J. Schramm

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. W. Sanson, Pres.

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Dear Mr. Sanson:

Well, we've sold three of them.

G. Wrattan

SUPERDEE EQUIPMENT
Interoffice Memo

To: G. Wrattan, Sales Mgr.

Dear Wrattan:

We've got to do better than this or we'll all be lined up at the employment office in just about six months.

How about a big advertising campaign?

Sanson

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. W. Sanson, Pres.

Dear Mr. Sanson:

It won't work. This machine would theoretically improve just about any fair-sized repair shop's efficiency, but it's still too expensive.

To judge by the response, we now have an acceptable Handler here. In time, it's bound to take hold, despite the cost, and obtain wide acceptance.

But this won't happen in six months.

G. Wrattan

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. Robert Schnitzer, Mgr.
Special Services Dept.

Dear Schnitzer:

Since you ran the computerized market simulation, on the basis of which we made this white elephant, I suggest you now find some way to unload it.

I would hate to be the man whose recommendations, presented in the guise of scientific certainty, were so disastrous that they destroyed the company that paid his salary.

A reputation such as that could make it quite difficult to find another job.

Sanson

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. W. Sanson, Pres.

Dear Mr. Sanson:

I have been giving this matter a great deal of thought, and have analyzed it on the Supervac-666.

The trouble is, the average individual does not use the available automotive repair facilities to a sufficient extent to assure the garage owner of enough income to afford our machine.

This is roughly analogous to the situation in the health industries some years ago.

I believe we might find a similar solution to be useful in this case.

W. R. Schnitzer

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. Robert Schnitzer, Mgr.
Special Services Dept.

Dear Schnitzer:

I frankly don't follow what you're talking about, but I am prepared to listen.

Come on up, and let's have it.

Sanson

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SUPERDEE EQUIPMENT
Interoffice Memo

To: G. Wrattan, Sales Mgr.
Dear Wrattan:

Schnitzer has one of the dammdest ideas I ever heard of, but it might just work.

I am getting everybody up here to meditate on this, and want to find out how it strikes you.

This *could* be a gold mine, provided we can get the insurance people interested.

Sanson

SUPERDEE EQUIPMENT
Interoffice Memo

To: G. Wrattan, Sales Mgr.
Dear Wrattan:

You will be interested to know after that discussion we had about Schnitzer's idea, that the insurance people are closely studying it. I could see whirling dollar signs in their eyes as I gave them the exact pitch Schnitzer gave me.

If they *do* go ahead, the banks will take a much rosier view of our prospects. We may weather this thing yet.

Sanson

FORESYTE INSURANCE
"In Unity, Strength"
Since 1906

Dear Car Owner:

How many times have you suffered inconvenience and delay, because of auto failures and breakdowns? Yet how often have you hesitated to have your car checked, and repairs carried out that might have prevented these delays and breakdowns—*because you were short of cash at the moment?*

You need no longer suffer this inconvenience. *Now you can prepay your car repair bills!*

Foresyte Insurance now offers an unique plan by which, for as little as two dollars a month, you can get *necessary repairs made on your car,* and *Foresyte will pay the bill!*

We call this our Blue Wheel car repair insurance plan. We are sure it will pay you to send in the coupon below, right away.

We can afford to make this offer because many cars will need no repairs, and the premiums for *those* cars will pay *your* repair bills! Send in the coupon today!

Cordially,
P. J. Devereaux
President

Schramm's Garage
1428 West Ave.
City

Dear Joe:

About that oil change and new filter: I've got Blue Wheel insurance now, so take care of it.

While the car's in there, check that pull to the left you mentioned.

Jack Bailey

SCHRAMM'S GARAGE

To: Jack W. Bailey
413 Crescent Drive
City

Parts: 6 qts oil	$3.90
#14-66 oil filter	4.95
#6612 brake shoes, 1 set	12.98
total	$21.83

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Labor: change filter
drain oil
put in fresh oil
install brake shoes
grind drums

total $24.00
total $45.83
Blue Wheel 45.83
Paid—J. Schramm

Note: Your transmission needs work. I can't work on it this week, because I'm swamped. How about next Wednesday morning?

Joe Schramm

Dear Joe:

Sure. I'll have the wife leave the car early.

Jack Bailey

SCHRAMM'S GARAGE

Dear Mr. Wrattan:

Please send me your latest information on your Automated Car Service Handling Machine.

I never saw so much business in my life. I am now running about a month behind.

Yours truly,
J. Schramm

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. Robert Schnitzer, Mgr.
Special Service Dept.

Dear Schnitzer:

We are now out of the woods, thanks to your stroke of genius on the prepayment plan.

Now see if you can find some way to step up production.

Sanson

FORESYTE INSURANCE
Interoffice Memo

To: J. Beggs, Vice Pres.
Blue Wheel Plan

Dear Beggs:

What on earth is going on here? After making money the first few months on Blue Wheel, we are now getting swamped.

What's happening?

Devereaux

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

I don't exactly know what's going on, but it completely obsoletes these figures of Sanson's.

We are going to have to raise our premium.

Beggs

SCHRAMM'S
SERVICATORIUM

Dear Mr. Wrattan:

Please put my name on the waiting list for another Handling Machine right away.

Yours truly,
J. Schramm

BLUE WHEEL
Prepaid Car Care

Dear Subscriber:

Owing to unexpectedly heavy use of the Blue Wheel insurance by you, the subscriber, we must raise the charge for Blue Wheel coverage to $3.75 per month, effective January 1st.

Cordially,
R. Beggs

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SCHRAMM'S SUPER SERVICATORIUM

Dear Mr. Wrattan:

We're going to need another Handling Machine as soon as we get the new wing finished next month.

Yours truly,
J. Schramm

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

I have to report that ordinary garages are now being replaced by "servicatoriums," "super servicatoriums," and "ultraservicatoriums."

These places charge more, which is justified by their heavier capital investment, and faster service.

Nevertheless, it now costs us more for the same job.

R. Beggs

BLUE WHEEL
Prepaid Car Care

Dear Subscriber:

Due to increasingly thorough car care offered by modern servicatoriums, and to continued heavy and wider use of such care, we find it necessary to increase the charge to $4.25 a month.

Cordially,
R. Beggs

SCHRAMM'S ULTRASERVICATORIUM

To: Jack W. Bailey
413 Cresent Drive
City

Parts: 1 set 22-638 brushes	$1.46
Labor: clean battery terminals set regulator	
overhaul generator	$21.00
total	$22.46
Blue Wheel	22.46
PAID	

Note: There's a whine from the differential we ought to take care of on the Machine. How about Friday morning? I don't see why there was more trouble with the generator and regulator. I think we ought to check everything again. Your Blue Wheel will cover it.

Joe Schramm

SCHRAMM'S ULTRASERVICATORIUM

Dear Mr. Wrattan:

I want three of your All-Pupose Diagnostic Superanalyzers, that will test batteries, generators, starters, automatic transmissions, etc., etc. Rush the order. I can't get enough good mechanics to do this work.

Yours truly,
J. Schramm

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

When I was a boy, I rode a bicycle with bad brakes down a steep hill one time, and got up to around sixty miles an hour as I came to a curve with a post-and-cable guardrail at the side, and about a sixty-foot drop into a ravine beyond that.

This Blue Wheel plan gives me the same no-brakes sensation.

Incidentally, have you visited a garage lately?

R. Beggs

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FORESYTE INSURANCE

Interoffice Memo

To: R. Beggs, Vice-Pres.
Blue Wheel

Dear Beggs:

What we seem to have here is some kind of weird mechanism that just naturally picks up speed by itself.

Without our insurance plan, the garages could never have gone up to these rates, because car owners wouldn't, or couldn't have paid them. Thanks to us, the car owners themselves now couldn't care less what the bill is. In fact, the higher it is, the more the car owner thinks he's getting out of his insurance.

The effect of this on the garage owner is to go overboard on every kind of expense.

Yes, I've visited a garage lately. I got a blowout over in Bayport, bought a new front tire, and on the way back noticed a vibration in the front end. Obviously, the wheel needed balancing.

However, when I tried to explain this to the Chief Automotive Repair Technician in Stull's Superepairatorium, he wouldn't listen. Before I knew what was going on, the car was up in the air.

Here's the bill:

Parts: 4 22-612 balance weights		$1.60
Labor	Complete diagnostic	$40.00
	Wheel removal	2.00
	Transport	1.50
	Superbalancomatic	6.50
	Transport	1.50
	Wheel attachment	2.00
	Car transport	3.25
	Total parts and labor	$58.35
	Blue Wheel	$58.35

PAID—L. Gnarth, C.A.R.T.

I think you can appreciate how I felt about Stull's Superepairatorium. I shoved past the Chief Automotive Repair Technician, and got hold of Stull himself. He listened, looked sympathetic, and said, "If you want, I will pay all of this but $2.75, which is about what it should have cost. But that won't change the fact that at least half of these bills are going to be higher than they should be, and it's going to get a lot worse, not better."

"Why?"

"Do you think anybody that learns how to tell what's wrong by using one of these diagnostic machines, and that learns how to repair a car with hydraulic pressers and handlers at his elbow, is ever going to be able to figure out what's wrong on his own, or do the work with ordinary tools? All he's learned to do is *work with the machine*. He *can't* do a simple job. He's *got* to make a big job out of it, *so he can use the machine*.

"Now," Stull went on, "a good, old-style mechanic narrows the trouble down with a few simple tests. For instance, if the car won't start, he tries the lights and horn, sees how the lights dim when he works the starter, watches the ammeter needle, notices how the starter sounds, checks the battery

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terminals and cables, checks the spark, bypasses the solenoid and sees if that's the trouble—in fifteen minutes, a good mechanic with a few simple tools has a good idea where the trouble is, and then it's a question of putting in new points, pulling the starter to check for a short, or maybe working on the carburetor or fuel pump. To do this, *you've got to understand first-hand the things you're working with.* Then the know-how is in your brain and muscles, and you can use it anytime.

"But now, with these new machines, especially this damned Combination Handling Machine and Diagnostic Analyzer, the skill and know-how *is in the machine.*

"What kind of mechanics do you think we're going to turn out this way? How many of them will ever be able to do *anything* without using the machine? And since the machine costs so much, what is there to do but charge more?"

That was how it went at the garage. I thought that was bad enough, but this thing is snowballing, and there's more to it. After I left the garage, I happened to take another look at the bill and noticed that this Chief Automotive Repair Technician had written "C.A.R.T." after his name. This struck me as peculiar, so I stopped at a roadside phone, and called up Stull. He sounded embarrassed.

"It's his . . . well . . . degree. It used to be a mechanic would have laughed at that. He had his skill, and knew it, and that was enough. But now, with these machines, a lot of these new guys don't *have* the skill. Now they've got no way to prop up their feeling of being worth something. So, we've got this NARSTA, and—"

"You've got *what?*"

"N.A.R.S.T.A.—National Automotive Repair Specialists and Technicians Association. They award what amounts to *degrees.* They limit the number of people who can be mechanics, because anybody off the street could learn to run the machines in a few weeks.

"The mechanic who writes 'C.A.R.T.' after his name? Is he your *chief* mechanic?"

"Naturally."

"Why pick him for chief mechanic?"

"Because he has a 'C.A.R.T.' degree. If I use a guy with an A.A.R.T., or an A.R.T., I get in trouble with NARSTA. NARSTA says all its people are professionals, and have to be treated according to their 'professional qualifications.' "

"That is, how good they are as mechanics?"

"Of course not. 'Professional qualifications' is whether the guy's got an A.R.T., and A.A.R.T., or a C.A.R.T. He may or may not be as good as another mechanic. What counts is that C.A.R.T. after his name. That changes his wage scale, changes his picture of himself, and makes an aristocrat out of him."

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There was more to this phone conversation, but I think you get the picture.

This mess is compounding itself fast. I talked to Sanson over at Superdee about it, but Superdee is making so much money out of this that Sanson naturally won't listen to any objections. Instead, he went into a spiel about the Advance of Science. Sanson doesn't know it, but this trouble comes because there is one science, and the Master Science at that, that is being left out of this. But I think if we put it to use ourselves we can end this process before it wrecks the country.

I have hopes that you know what I am talking about, and will see how to put it to use.

Bear in mind, please, that when the rug is jerked out, we want *somebody else* to land on his head, not us.

I might mention that I have recently had cautious feelers from one Q. Snarden, who turns out to be the head of NARSTA. Snarden wants, I think, to take over Blue Wheel.

He would then, I suppose, run it as a "nonprofit" organization. Do you get the picture?

Devereaux

FORESYTE INSURANCE

Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

I don't know just what you mean by the "Master Science." But I have a good idea what we ought to do with this Blue Wheel insurance.

Suppose I come up this afternoon about 1:30 to talk it over?

R. Beggs

FORESYTE INSURANCE

Interoffice Memo

To: R. Beggs, Vice Pres.

Blue Wheel

Dear Beggs:

I have now had a chance to analyze, and mentally review, your plan for dealing with Snarden and Blue Wheel. I think this is exactly what we should do.

We want to be sure to run out plenty of line on this.

Devereaux

BLUE WHEEL

A Nonprofit Organization

NARSTA-Approved

Dear Subscriber:

In these days of rising car-care costs, one of your most precious possessions is your Blue Wheel policy. To assure you the best possible service at the lowest cost, Blue Wheel is now operated under the supervision of the National Automotive Repair Specialists and Technicians Association, as a *nonprofit* organization.

Yes, Blue Wheel now gives you real peace-of-mind on the road. And your Blue Wheel card will continue to admit your car to the finest Servicatoriums, whenever it needs care.

But as costs rise, the charges we pay rise.

As we spend only 4.21% on administrative expenses, you can see we are doing our best to hold prices

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down; but costs are, nevertheless, rising.

To meet the costs, we find it is necessary to raise our premium to $5.40 a month.

When you consider the cost of car care today, this is a real bargain.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL
(Nonprofit)
NARSTA-Approved

Dear Subscriber:

For reasons mentioned in the enclosed brochure, we are forced to raise our premium to $6.25 a month.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL

Dear Subscriber:

Blue Wheel has fought hard to hold the line, but next year, rates must go up if Blue Wheel is to pay your car-care bills.

As we explain in the enclosed booklet, Blue Wheel will now cost $8.88 a month.

This is one of the greatest insurance bargains on earth, when you consider today's car-care costs.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL

Dear Subscriber:

Blue Wheel is going to have to raise its rates to meet its ever-increasing costs of paying *your* car-care bills.

Future rates will be only $10.25 a month.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL

Dear Subscriber:

Blue Wheel's new rates will be $13.40 a month.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL

Dear Subscriber:

Blue Wheel is going to $16.90 a month effective January 1st.

See our enclosed explanation.

Cordially,
Q. Snarden
Pres.

BLUE WHEEL

Dear Subscriber:

$22.42 a month is a small price to pay to be free of car-care expense worries nowadays.

This rate becomes effective next month.

Cordially,
Q. Snarden
Pres.

SCHRAMM'S
SERVICATORIUM

To: Jack W. Bailey
413 Cresent Drive
City

Parts:	1 set 22-638 brushes	$2.36
Labor:	Super diagnostic	85.00
	Giant Lift	65.00
	Manipulatorium	55.00
	Extractulator	28.00
	Gen. transport	1.25

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Treatment	12.50
Checkulator	4.50
Gen. transport	1.25
Ultramatatonic	5.00
Installator	15.00
Ch. transport	3.75
Checkulator final	6.50
Ch. transport	3.75
Car transport	5.25
Total parts and labor	$291.75

Blue Wheel $291.75 PAID

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

The other day, the turn-signals on my car quit working, and before I got out of the garage, the bill ran up to $417.12.

In today's mail I got a notice that Blue Wheel, with Snarden at the helm, is going to raise its rates to $28.50 a month.

This notice, by the way, piously states that administrative costs now only come to 2.4% of Blue Wheel's total revenues. Naturally, if they keep raising their revenues by upping the premium, administrative costs will get progressively smaller, in proportion to the total. The percentage looks modest, but that's 2.4% of *what?*

I was talking to a physicist friend of mine the other day, and he says the trouble is, the car-repair setup now has "positive feedback," instead of "negative feedback." When the individual owner used to pay his own bills, his anger at high bills, and his reluctance or even inability to pay them, acted as negative feedback, reacting more strongly against the garage the higher the bills got. But now, not only is there none of this, but the garages are used *more* the higher the Blue Wheel premiums—because people feel that they should get *something* out of the policy. This is postive feedback; and my physicist friend says that if it continues long enough, it invariably ends by destroying the system.

Already there is talk of government regulation, and of plans to spread the burden further by taxation. This is just more of the same thing, on a wider scale. It will only delay the day of reckoning, and the trouble when the day of reckoning comes.

I think we'd better pull the plug on this pretty soon.

R. Beggs

FORESYTE INSURANCE
Interoffice Memo

To: R. Beggs, Vice-Pres.
Special Project

Dear Beggs:

Snarden goes before the congressional investigating committee next week.

When he is about halfway through his testimony, and has them tied in knots with his pious airs and specious arguments, *then* we want to hit him.

Have everything ready for about the third day of the hearing.

Devereaux

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FORESYTE INSURANCE
Interoffice Memo

To: R. Beggs, Vice-Pres.
Special Project

Dear Beggs:

Now's the time. Snarden has pumped the hearing so full of red herrings that it looks like a fish hatchery.

Pull the plug.

Devereaux

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

The first ten million circulars are in the mail.

Beggs

FORESYTE INSURANCE
"In Unity, Strength"
Since 1906

Dear Car Owner:

When car-care insurance cost two dollars a month, it was a bargain. Now it costs about fifteen times as much.

This present insurance plan is so badly set up that it *forces up car-care costs.* And when car-care costs go up, *that forces up insurance premiums.*

This is a vicious circle.

Before this bankrupts the whole country, Foresyte Insurance is determined to stop the endless climb of these premiums, by offering our *own* plan.

Possibly, after paying these present terrific bills, you will understand why we call our plan *Blue Driver.* But you won't feel blue when you learn that our monthly rates on this new insurance are as follows:

$90.00	deductible 90%	$18.50
90.00	deductible 75%	12.50
90.00	deductible 50%	5.25
$180.00	deductible 90%	$13.75
180.00	deductible 75%	7.95
180.00	deductible 50%	3.75

Compare this with what you are paying now.

We are convinced that the huge increase in car-care costs is due mainly to the fact that the system now used makes it *nobody's* business to keep costs down, and puts the ever-increasing burden just as heavily on the man who *doesn't* overuse the plan as on the man who does.

Our plan is different, and puts the burden where it belongs—*on the fellow who overuses the plan.* You don't have to pay for all *his* expenses. He can't get away *without* paying extra for them. This is how it should be. Moreover, this plan gives good protection, at a lower cost.

For instance, with our $90.00 deductible 90% plan, you pay the first $90.00 of the bill yourself. True, $90.00 is a lot of money, *but in less than a year's time, you save that much or more in premiums.*

The 90% of the plan means that *we pay 90% of the rest of the bill.* You only have to pay 10%. On an $825.00 bill, for instance, you pay $90.00, which you have probably already saved because our premiums are so much lower. This leaves

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$735.00. We pay $661.50 of this, right away. *You pay only what's left.*

This lets you pay the small bills you can afford, while we take most of the big bills that everyone is afraid of these days.

Meanwhile, the less you use the plan, *the more you save.*

The larger the share of the risk you are willing to take, *the more you save.* Our $180.00 deductible 50% plan *costs only $3.75 a month.*

Because we may be able to lower premiums still further, these rates are not final. But at these rates, you can see that this plan rewards the person who doesn't overuse it.

We are already using this plan ourselves, and saving $10.00 to $24.75 a month on it.

How about you?

Cordially,
R. Beggs
Vice-Pres.

413 Crescent Drive
Crescent City

Dear Mr. Beggs:

Here is my check for $7.95. I am signing up on your $180.00 deductible 75% plan, and saving $20.55 a month.

But you better not jack the rates way up, or I will go back to Blue Wheel. If we only burn one light in the house, heat one room, and eat cornmeal mush twice a day, we can still pay *their* premiums.

Yours truly,
Jack Bailey

SCHRAMM's
SUPER
SERVICATORIUM

To: Jack W. Bailey
413 Crescent Drive
City

Note: Time for oil change, new filter. Our Automatic File Checker also says it is time your car had a Complete Super Diagnostic and Renewvational Overhaul on our special new Renewvator Machine. Your Blue Wheel will cover it.

Joe Schramm

Dear Joe:

In a pig's eye my Blue Wheel will cover it. I'm a Blue Driver now, and I get socked 180 bucks plus 25% of the rest of your bill, and it sounds to me like I will get hit for enough on this one to buy a new car.

Keep the Renewvational Overhaul. As for the Complete Super Diagnostic, I found an old guy out on a back road, and he can figure out more with a screw driver, a wrench, and a couple of meters than those stuck-up imitation mechanics of yours can find out with the whole Super Diagnostic Machine.

Don't worry about the oil change. I can unscrew the filter all by myself. I will pay myself $4.50 for the labor, and save anyway a hundred bucks on the deal.

If the transmission falls out of this thing, or the rear axle climbs up into the back seat, I'll let you know about it. But don't bother me

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when it's time to oil the door handles and put grease on the trunk hinges.

Jack Bailey

SCHRAMM'S
SUPER
SERVICATORIUM

Dear Mr. Wrattan:

I just got your monthly booklet on "New Superdee Labor-Saving *Giants.*"

Since the paper in this fancy booklet might clog up my new oil burner, I'm afraid I don't know what to do with it.

I am enclosing half-a-dozen letters from ex-customers, and maybe they will explain to you why business is off twenty per cent this month.

Yours truly,
J. Schramm

SUPERDEE EQUIPMENT
Interoffice Memo

To: W. W. Sanson, Pres.

Dear Mr. Sanson:

I am sending up a big envelope containing letters from garagemen and their customers. These letters are representative of a flood that's coming in.

What do we do now?

G. Wrattan

SUPERDEE EQUIPMENT
Interoffice Memo

To: G. Wrattan, Sales Mgr.

Dear Wrattan:

I put this one to Schnitzer and his Supervac 666. It flattened them.

There's just one thing *to* do. We take a loss on this latest stuff, and get out while we're still ahead.

As for these questions as to how much we offer to repurchase Renewvators, Giant Lifts, et cetera, we don't want them at any price. Point out how well made they are, and how much good metal is in them. That's just a hint to the customer, and if he deduces from that that the best thing to do with them is scrap them, that's *his* business.

Do you realize it cost me $214.72 to get a windshield-wiper blade changed the other day? They ran the whole car through the Super Diagnostic first to be sure the wiper blade *needed* to be changed.

As far as I'm concerned, this whole bubble can burst anytime.

Sanson

SCHRAMM'S
ECONOMY GARAGE

To: Jack W. Bailey
413 Crescent Drive
City

Parts: 1 set 22-638 brushes	$1.48
Labor: overhaul generator	
set regulator	8.50
total	$9.98

Note: Time for oil change, new filter. We will take care of this for you next time you're in—no charge for labor on this job. Al Putz says there was a funny rumble from the transmission when he drove the car out to the lot. We better check this as soon as you can leave the car again. Once those gears in there start grinding up the oil slingers and melting down the bearings, it gets expensive fast.

Joe Schramm

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Dear Joe:

Thanks for the offer, but I'll take care of the oil change myself. I want to keep in practice, just in case the country comes down with another epidemic of Super Giant Machinitis.

As for that rumble from the transmission, I jacked up a rear wheel, started the engine, and I heard it, too. It had me scared for a minute there, but I blocked the car up, crawled under, and it took about three minutes to track down the trouble. In this model, the emergency brake works off a drum back of the transmission. Since I brought the car down to your garage, one end of a spring had somehow come loose on the emergency brake, and this lets the brake chatter against the drum. It was easy to connect the spring up again. The transmission is now nice and quiet.

I am enclosing the check for $9.98.

Jack Bailey

FORESYTE INSURANCE
Interoffice Memo

To: P. J. Devereaux, Pres.

Dear Mr. Devereaux:

We were able to bring the rates on Blue Driver car-care down again last month. We are still making a mint from this plan, even with reduced premiums, and we are still getting enthusiastic letters.

I can see, in detail, how this works, by giving everyone involved an incentive to keep costs down. But I am still wondering about a comment you made earlier.

What is the "Master Science" you referred to, in first suggesting the idea of this plan?

R. Beggs

FORESYTE INSURANCE
Interoffice Memo

To: R. Beggs, Vice-Pres.
Blue Driver

Dear Beggs:

I am delighted you were able to bring the premium down again. Maybe we will get this thing within reason yet.

What do you *suppose* the Master Science is? Isn't it true to say that Science first comes into existence when the mind intently studies actual physical phenomena? And the mind operates in this and other ways, doesn't it, when it is moved to do so by reasons arising out of *human nature?*

What is the result when the mind intently studies *human nature?*

Engineers, physical scientists, biological scientists, mathematicians, statisticians, and other highly-trained specialists do work that is useful and important. As a result, we have gradually built up what amounts to a tool kit, filled with a variety of skills and techniques.

They are all useful, but nearly every time we rely on them alone and ignore human nature, we pay for it.

All our tools are valuable.

But we can't forget the hand that holds them.

Devereaux

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MICROMINIATURE INDUSTRY

It's the oldest industry on Earth.
It's the smallest, most completely microminiaturized industrial plant—and it really is a plant—on Earth.
And it's the newest industry, with the greatest potential, under the wildest conditions, for the lowest investment, producing the most intricately-structured molecules for pennies, where previously they cost tens of dollars!

CARL A. LARSON

The lazy shall inherit the earth. Our present technology, the bloom of a civilization of push and hurry, taming high pressures, using enormous temperatures, has as its capstone developed the hydrogen bomb to blow itself up. Then a new technology will spire from ancient roots, leaving man time to lie in the grass and watch the clouds while domesticated microbes do all essential jobs.

Microbial procedures are certainly not confined to the world of fantasy and distant future; we use their products every day. In order to grasp the potentialities of microbes we need, however, a short reminder of their capacity to produce and some hints about their chemical adaptability before going into the origin and application, present and coming, of industrial microbiology.

First, the quantitative aspects of the chemical work performed by microbes may be sized up against the background of the carbon cycle. We all remember that carbon is drawn into the life cycle by green plants, yet another dozen billion tons of this element is caught by the photosynthetic activity of microscopic algae in the oceans. By doubling the sum just cited we get the annual total, helping us to fathom the thought of turnover of all atmospheric carbon dioxide, completed in twenty years. But for the CO_2 production by microorganisms this source of carbon would soon be exhausted and so green plants would perish, animal life with them.

Moreover, the nitrogen that builds our cells and those of plants and animals has passed the chemical factories of nitrogen-fixing mi-

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crobes, in the absence of which atmospheric nitrogen would be mainly inaccessible. Nitrogen liberating bacteria decompose organic matter, preventing Earth from becoming one vast mortuary. Thus N_2, the main component of the immense ocean of air around us, has passed through and been set free by denitrifying bacteria.

A third essential constituent of plants and animals, sulfur, is kept in its eternal cycle of composition and reduction through the quiet work of specialized microbes.

Thus the quantitative aspects of microbial yield raise no limit to the conceivable applications of the enzymatic activities of bacteria and molds in industrial procedures. For sheer bulk product microbes are unsurpassed.

As to the second aspect, the chemical adaptability of microbes, the omnipresence of microorganisms is, of course, a result of their genetic diversity. This, in turn, becomes manifest through the ability of microbes to produce a variety of enzymes, effective in highly diverse environments.

To illustrate extreme specialization, some salt-craving bacteria do not grow well below concentrations of twenty per cent sodium chloride, in such brines no other microorganisms thrive. Within the group of chemolithotrophic bacteria we meet living cells which are independent of organic substrates. They use such sources of energy as gaseous hydrogen, elemental sulfur and iron salts for their growth.

Together with such adaptability to extreme chemical conditions goes a remarkable range of adjustment to temperature and pressure. Thus some bacteria thrive at −7 centigrade while others grow at 80 centigrade; the Galathea deep-sea expedition found bacteria at the greatest depths; they could be grown only under pressures of 700 to 1,000 atmospheres.

The basic information for adjustment and specialization within a given sphere of life, narrow or sometimes rather wide, inheres in the DNA molecules of the microbes. While some of them are confined to extremely narrow niches, as a whole they teem in unfathomable abundance from desert to tundra. Even below the tundra, in the permafrost of Alaska, bacteria have been found in material of radiocarbon dated 20,000 to 70,000 years, virtually the oldest living cells of our planet.

Thus the fantastic adaptability of microbes, going with a richly varied specialization, grants a remarkable versatility under natural selection. Microbes can do anything.

Though the first true understanding of man-controlled microbial exploits came with Pasteur in the latter half of the nineteenth century, some forerunners of present-day industrial procedures date back beyond history. The retting of flax

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and hemp, the sweating of hides and the artificial selection of yeasts for various purposes belong to that primeval applied microbiology.

Sometimes industrial procedures of today basically consist of scale-up procedures of yesterday. Food industries founded on the enzymatic activities of various yeasts exemplify mass production long running parallel courses with household manufacture.

Returning to microbial procedures in food and feed production as our next item, we may pause here and ask how primitive man

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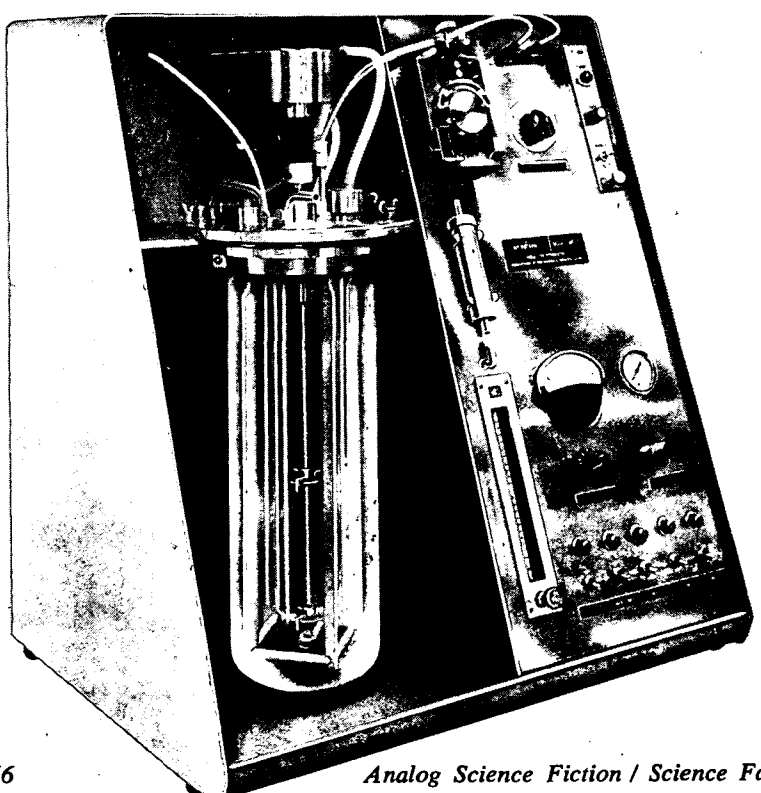
The biologist's test tube is a culture-medium plate, frequently. When a chemist has proved out a reaction in test tubes, he goes to bench-scale, or pilot-plant scale to see whether his new reaction can be enlarged to commercial size. This device—made by the New Brunswick Scientific Co., Inc.—is the industrial biochemist's pilot-plant test system. The microminiaturized plants may be small—but the industrial tonnage needs to grow large.



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could get hold of and keep helpful microorganisms.

Part of the answer lies in the omnipresence of bacteria and fungi, often in enormous quantities. Six inches of topsoil contain about two tons of microorganisms per acre, many of them yeasts. Several species of a variety of yeast genera are widespread on plants. They fill out the diet of insects, some of which use specialized intestinal yeast strains to digest bark and wood. Wild yeasts on overripe fruit prepared the brew for the first boozehound, who was four-legged more likely than two-legged.

The rest is mostly hit-and-miss selection of suitable yeasts combined with craftsman tradition and glints of keen comprehension between centuries of blind handling. True, in 1680 Leeuwenhoek saw yeast cells through his home-made lenses. For a century and a half this observation did not weaken the hoary conviction that wine fermentation was just a mechanical separation of impurities from the beverage.

The term *fermentation* derives from a latin word meaning *to boil,* it relates to the vigorous gas generation in young wine. Now the term generally applies to the conversion, with or without effervescence, of organic substances by the action of microbial enzymes, previously called ferments.

In particular, yeasts do two things:

$$C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$$

meaning that hexose sugars, via a series of intermediate steps, are turned into ethyl alcohol and carbon dioxide. Breweries use both products, selling the excess carbon dioxide as dry ice. Producers of baker's yeast suppress both end products in order to get a substantial yield of live yeast cells, while bakeries need the carbon dioxide to raise their bread.

Besides the omnipresence of microbes and a long experience in handling them, craftsmen were and are aided by the property of microorganisms to breed true. Encoded in the DNA of each yeast strain lies the inherited information for the production of varying amounts of not only alcohol and carbon dioxide, but also the minor products which give, for instance, the wine from a special district its inimitable flavor.

It remained for our time to see big companies lock horns in the courts over a billion dollar bacterial strain, but the yeast strains of the traditional wine districts were jealously guarded before they became commercial products. Originally, no yeast was added to the grape juice. The characterizing yeast strains growing on the husks worked in the vats and barrels with nobody knowing what really happened.

The distinct hereditary properties of yeast strains do not exclude contamination; the intrusion of

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wild yeasts make the brewer's nightmare. Not too long ago commercial wines were of remarkably variable quality, sometimes mariners remarked that the taste improved when the wine had fretted the bottles and an eighteenth century chemist actually recovered glass ingredients from such wine.

Before parting with yeasts we let the use of sourdough remind us of the important fact that many yeast strains thrive at a rather limited interval of acidity. This holds also for several other microbes. In the sourdough lactic acid bacilli promote the growth of a useful yeast strain and check contaminants.

In pickled food this property of lactic acid bacteria to prevent contamination and foulness serves the purpose of preservation. Combined with salt for further restriction of harmful microbes lactic acid, added as such or by fermentation, has a wide market in food conservation today and may find new applications tomorrow. Lactic acid fermentation played an important part in primitive food preservation, thus sauerkraut very likely saved Leif the Lucky and his crew from scurvy on their long voyage ten centuries ago.

Some present-day uses of microorganisms in the food industries have been summarized in Table I. Much of this industrial utilization of yeasts and bacteria is still fraught with empiricism. On the other hand systematic studies of such problems as those of the competitive and symbiotic behavior of milk bacteria are under way and make fair promise.

A somewhat special use of yeasts still belongs to the food section though its importance pertains to the recent past and, in view of the world-wide need for proteins, probably to the near future. Quite as baker's yeast can be cultivated for bulk by preventing fermentation, edible yeasts can be grown to serve as food and cattle feed.

The latter type of yeasts, grown on spent cooking acid from the sulfite process, became almost popular in Scandinavia during the last war. Pulp plants everywhere have trouble with their waste liquor. Some four hundred pounds of nutrients usable for yeast cultivation emerge for each ton of paper pulp; a yearly production of 100,000 tons of pulp being no rarity for a single plant. With the help of Torula yeasts some of this waste was turned into protein, vitamins and minerals badly needed by people and livestock.

In the matter of industrial microbiology applied to mass production World War I marked an episode rather than a new era. Among the minor by-products of alcoholic fermentation glycerol attracted some interest in 1911, when it was shown that acetaldehyde is an intermediate step in the production of alcohol by yeast enzymes. To

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demonstrate this in the laboratory calcium sulfite was added, eliminating acetaldehyde from further fermentation. Now glycerol became the main product instead of alcohol.

A few years later glycerol gained a lot of fervid attention as raw material for the production of nitroglycerin. Before and after the war glycerol was just a by-product of the soap industry; with increasing war demands the yeast cells were called up and, by use of the sulfite process, produced some two thousand tons of glycerol a month in two dozen German factories.

The yield was relatively low but suitable yeast strains and carefully adjusted pH can convert substantial quantities of sugar to glycerol.

Events creating the need for glycerol also forced the British government to engage a bacillus, *Clostridium acetobutylicum,* in the manufacture of acetone. This product, necessary for the ammunition industry, had so far been prepared by dry distillation of calcium acetate, which was expensive and critically scarce.

Using corn or molasses for a medium the chosen bacillus worked out the acetone necessary to win the war. Its main product was thought of as waste, two or three gallons of butyl alcohol being produced to each gallon of acetone. By-products are gaseous hydrogen and carbon dioxide, and ethyl alcohol.

Though the acetone-butanol fermentation and similar processes claimed some attention in the United States during World War I, the demand for acetone soon abated. A new situation developed when butanol, the former waste product, found a new market as starting material for esters used as solvents in quick-drying lacquers. These were in high demand in the rapidly developing automobile industry. To meet this demand fermentative production of butanol soared to scores of million pounds in the United States alone.

Fermentors contain up to five hundred thousand gallons; getting the wrong bacillus loose on this scale would be a real nuisance. Acetone is not just a waste product; even under peacetime conditions it finds numerous uses as a solvent. With the additional uses of butanol in a richly ramifying industry the annual United States market for both products has now swelled to more than a billion pounds. Apparently industrial fermentation holds an important position here, with the additional boon of waste solids containing riboflavin paying even better than the butanol of the fermentation process. Riboflavin in this form is sold as a highly estimated food supplement. It is a vitamin needed for normal growth, for cellular metabolism and for the health of skin and mucous membranes.

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Nevertheless, the market is dominated by synthetic procedures with the cracking industry conspicuously in the foreground. Mass production of acetone and butanol by fermentation is far from out, but this and similar processes, such as acetone-ethanol fermentation by *Bacillus macerans* and butanol-isopropanol fermentaton using *Clostridium butylicum*, carry greater weight in countries with need for disposal of agricultural waste products, for low investment costs and dispersed localization diminishing transport problems, and without a highly competitive petroleum cracking industry.

Right now you are using carbon black in the form of printing ink. More likely than not it derives from thermatomic cracking of methane. Occurring as natural gas, this technical process combines cracking with burning and yields considerable quantities of hydrogen as a salable by-product. Besides its natural occurrence large quantities of methane are produced by sludge bacteria in sewage disposal plants. Here again we meet the situation of microbial mass production. We may add *directed* microbial production as natural gas is, of course, produced by bacterial decomposition of organic matter, competing with rich sources seemingly inhaustible.

But carbon black from ethane and methane with its immense market of hundreds of millions of pounds is only one product to mention in this connection. By chlorination methane yields solvents of technical value and the gas is widely used as a fuel. Of minor importance only is the electric arc cracking of methane to get acetylene, but this procedure was used on a really large scale in Germany during World War II. The future of the activated sludge process for methane production hinges not only on these and forthcoming technical uses of the product, however; purification of polluted waters is not likely to scale down in importance in the foreseeable future and remains a source of quantities of cheap methane.

Speaking of mass production we must, finally, again mention, if only briefly, ethanol—common ethyl alcohol. Though this product has been known to find other uses its predominant role remains that of an industrial raw material. It is used as a solvent, an extractant and often enough as an energy source. The number of organic syntheses departing from ethyl alcohol via acetonitrile alone is high. The products going to the dye and drug markets include synthetic rubbers and resins and find uses as explosives and pesticides.

Though synthetic production, by catalytic hydration of ethylene and by a Fischer-Tropsch process as a by-product in the synthesis of methyl alcohol, dominates the market to the tune of a well rounded

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billion pounds a year, millions of gallons are still produced by yeast fermentation.

So much for mass production of industrial chemicals by bacteria and yeasts. Now to the wider topic of microbial production of fine chemicals. Sparing the more special issue of biologicals for a later section, we turn to citric acid and other products of *Aspergillus* strains and immediately arrive at an illustrating chapter of contemporary history.

Until 1923 extraction from citrus fruits—basically simply squeezing lemons—satisfied the whole market for citric acid; some ninety per cent of the world supply came from Italy. In the year just mentioned microbial production began in the United States, soon satisfying the internal market and conquering export markets. Today citric acid is produced almost exclusively by fermentation of molasses —carefully selected strains of the fungus *Aspergillus niger*. The annual production in the United States is about fifty million pounds.

Another *Aspergillus* species, *Aspergillus terreus*, ferments glucose to itaconic acid for use as a raw material in industrial synthetic procedures, notably in the plastic industry. Special strains of *Aspergillus niger* produce gallic acid for the printing and tanning industries. These microbes sour out invading bacteria thus eliminating the problem of asepsis.

Aspergillus niger has no sexual cycle, but in the early fifties G. Pontecorvo in Glasgow, Scotland, succeeded in combining nuclei of different mold strains grown on selective media. Thus cross-bred strains could be produced with the path opened to combinations of desirable properties from different strains. Genes, the molecules of inheritance, could be put to work in teams just like the combinations of genes for high yield, rust resistance and earliness utilized by wheat breeders.

Several bacterial species produce diol, or 2,3-butanediol; the stereoisomeric form used as an antifreeze is generated by *Bacillus polymyxa*. A bacterial strain capable of diol-hydrogen fermentation leavens the bread of Amish and Mennonite women in some back-country Pennsylvania kitchens. This notable piece of astute kitchen bacteriology, practiced in the good old way, gives the following result:

$$C_6H_{12}O_6 \rightarrow$$
$$CH_3.CHOH.CH_3 + H_2 + 2CO_2$$

The hydrogen helps raise the bread—it is the world's lightest!—and the diol gives it a flavor never matched.

Age-old techniques with some modern refinements can make bacteria eat and thrive on just anything. Shrewd applications of such old and new tricks can pique microbes to produce virtually any substance. Soil has been enriched with naphthalene which becomes

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the sole carbon source for growth. Strains of the soil *bacillus Pseudomonas* are thus brought to the fore. Their product, salicylic acid, is converted to its aldehyde by an electrolytic procedure. The perfume industry uses great quantities of its derivative, coumarin, to catch the smell of new-mown hay. Now that cheap and remarkably pure napthalene can be obtained from petroleum, the *Pseudomonas* procedure seems to have a future.

Lactic acid, met with in connection with food processing, is widely used in the plastics industry, to produce inks and lacquers, to mordant chrome and for several odd jobs. Industrial fermentation has been the standard procedure for more than eighty years; the annual production in the United States keeps rather steadily at five million pounds. Molasses, whey and corn sugar are suitable media; sulfite waste liquor, sawdust and straw can be prepared to serve as raw material. *Lactobacillus delbrueckii* and *Lactobacillus bulgaricus* convert up to ninety-eight per cent of the sugar in the medium to lactic acid, provided that an optimal pH is maintained.

Several other lactic acid bacteria have potential industrial uses although their yield of lactic acid is low; making up for this they produce succinic acid of pharmaceutic and photographic utility and formic acid of use to coagulate rubber latex and disinfect hides.

Several molds of the genera *Penicillum* and *Aspergillus* produce oxalic acid, a useful laboratory reagent and cleansing agent. Decreased access to phosphate and nitrate causes the same molds to produce gluconic acid, used mainly by the pharmaceutical industry.

Before the subject of fermentations for fine chemicals is left for the closely related subject of fermentations for biologicals three points must be made. The first refers to microbial production of complex substances, the second to the drastic change in the supply of amino acids brought about by microbial production, the third to specific abilities of microorganisms.

As for complex substances, microbes synthesize polysaccharides, complex fatty acids, fats and sterols when grown on glucose and nutrient salt. Limitation to the production of simple compounds is no characteristic of microbial activity; the biologically active substances of the next section are complex molecules. To mention only one mold, the well-studied *Aspergillus Sydowi* synthesizes a number of saturated and unsaturated fatty acids, ergosterol and related compounds, volatile acids and glycerol to boot. This relatively new knowledge opens provocative trails into the future.

The second point is illustrated by the price reduction of laboratory

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grade glutamic acid from eight hundred dollars a pound in the pre-microbial era to four dollars a pound today. Large-scale search by Kinoshita revealed that *Micrococcus glutamicus* accumulates heaps of this amino acid—tens of thousands of pounds are now produced annually. Other Japanese scientists have induced mutations in *Micrococcus glutamicus* enabling this bacterium to produce several other amino acids. From expensive laboratory reagents these have changed into potentially life-saving food additives in regions with a lopsided agriculture. Bacteria have accomplished sudden and profound changes in the lot of man in the past and they are doing so today.

The third point stresses the substantial capacity of microorganisms to attack, at tepid temperature, on reasonable commercial terms, specific chemical positions which are often inaccessible to standard procedures. The list of such highly specific tasks rendered by microbes numbers not hundreds but thousands.

To mention only one of them—and now we enter the field of biologicals—selected strains of *Acetobacter suboxydans* convert sorbitol, an alcohol made from technical dextrose by hydrogenation. The yield has, at a critical point of the molecule, the configuration of ascorbic acid, also known as vitamin C. The bacterial fermentation now serves to produce this inexpensive vitamin that costs two hundred dollars an ounce before bacterial manufacture came into use.

The vitamin industry largely depends on yeasts and bacteria, which either produce or concentrate a dozen of these necessary food factors and feed additives.

Microbial enzymes, which perform all these miracles, are now being produced on a large scale and sold as such. They are natural, highly efficient catalysts used in medicine and for many industrial purposes.

Among several other major products of the pharmaceutic industry dextran has a claim upon special attention. This branched glucose polymere, a product of *Leuconostoc mesenteroides* strains, is used as a safe and handy blood plasma substitute amply proving its value in the treatment of surgical shock during the Korean War.

Pondering the immense prowess of microbes we may ask how Earth escapes the fate of becoming the core of an immense ball of confluent microbe masses. The answer lies in the microbial antagonisms understood by Pasteur and many early bacteriologists. Inhibition of bacterial growth by the green mold, *Penicillium*, was reported in the nineteenth century; the first antibiotic drug came into the market at the turn of the century under the name *pyocyanase*.

Microbes could be made to fight microbes; Alsberg and Black iso-

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lated penicillic acid from a *Penicillium* mold in 1913 and its antibacterial effect became known. Fleming reported the antibiotic effect of pencillin in 1929 and other antibiotics came to light in American and European laboratories.

Then came the sulfa drugs. Next the second world war when exaggerated hopes based on peacetime experience of these drugs vanished. The *Penicillium notatum* mold rescued, within months of its grand-scale debut in Peoria, Illinois, thousands of lives with its fermentation product from corn steep liquor —penicillin.

Since then systematic studies of soil samples have revealed numerous strains of fighter microbes, including the remarkable *Streptomyces* bacteria. These form colonies resembling those of molds on a smaller scale, with a bottom layer of interwoven threads covered by a dustlike layer of rounded spores.

These spores contain the genetic information of the bacteria, encoded in the spore DNA. Like mushroom spores their bacterial counterparts form hardy resting bodies, capable of survival under untoward conditions for years and decades.

When a *Streptomyces* spore finds a suitable growing ground it produces fine tubes that lengthen and branch. Some of the tubes, or hyphae, dive into the substrate, others grow out from what soon becomes a colony, enlarging it. Other tubes grow upward to be transformed into chains by spores, favorite subjects for manipulation with X rays, ethyleneimine, nitrogen mustard and ultraviolet light in attempts to improve industrial strains through genetic changes.

The manufacture of *Streptomyces* drugs has expanded in a remarkable way since 1943, when streptomycin was discovered at the New Jersey Experiment Station. The antibiotics of Table 2 serve to illustrate this development. Their chemical variety is great and a corresponding versatility in attacking hardy disease provoking microbes is intensely utilized in the clinic.

Very large amounts of antibiotics are used as feed additives promoting the growth of poultry and herd animals. They are also used as food preservatives and to a limited but possibly increasing extent as fungicides in gardening.

Among the many antibiotics to be tested and discarded actinomycin was blacklisted for inhibiting the normal production of white blood cells. Since 1952, however, actinomycin C from *Streptomyces chrysomalleus* and a dozen other *Streptomyces* products have been found to hamper the reproduction of cancer cells. A great number of other antibiotics have been tested and no definite obstacle meets the thought of modifying one of them to kill only the tumor. Today the most hopeful, if not the smoothest, path to real progress worms

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through a deepening understanding of how cancer cells reproduce, how genes for drug fastness act and where, in chromosome replication, drugs intervene.

Leaving this flourishing field with the additional note that U. S. patients paid two hundred million dollars in 1964 for tetracycline alone, we turn to microbial feats in the production of hormones. Among these blood-borne chemical messengers the steroids include estrogens or female hormones, androgens or male hormones and corticoids or adrenal cortex hormones. In addition progesterones belong to this group. They can roughly be characterized as pregnancy hormones.

In 1946 the first synthesis of cortisone acetate was reported by Sarett, who got 11 mg of the steroid in two years of work starting with bile acid. Three years later came the dramatic report from the Mayo Clinic by Hench and his coworkers: Cortisone greatly helped rheumatoid arthritis.

A resourceful commerical laboratory succeeded in producing 938 gm of cortisone acetate in twenty-five months. Then it was remembered that microorganisms can do just anything. The difficult introduction of the oxygen function into the 11 position of the molecule was performed by the fungus *Rhizopus nigricans*. Soon a modest relative of the diphtheria bacillus produced a steroid more than three times as active as the natural hormone. Today dozens of microbes, including strains of *Aspergillus, Streptomyces* and *Penicillium,* are busy producing commercially valuable steroids used as antiallergic, antiinflammatory and metabolic drugs.

Feeders of broilers, turkeys and beef cattle use considerable quantities of estrogen and its inexpensive derivatives to produce chemical capons and geldings. Here the large scale industrial production has opened a wide field of entirely new applications.

And now to the future. No limitations to the wider use of microbiologic processes inheres in the microorganisms, but their prospective handlers—young engineers —today are lucky if they get a little microbiology during the first term of their junior year. At the executive level there is reluctance to leave a job to live bugs, and suggestions in that direction from the junior level risk being considered undignified. Once the task consisted of removing the gelatinous layer from triacetate films; somebody suggested a microbial process and the wild idea worked. A strain of *Bacillus mesentericus* regenerates films in fifteen to sixty minutes, a completely sound standard procedure.

It will pay to let bacteria do jobs that are not worth an effort involving expensive machinery and manhours. Instead of working low-

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grade copper ore in the traditional way mines can be flooded and charged with sulfur-metabolizing bacilli. The idea is not far from reality; the Utah Division of the Kennecott Copper Corporation uses *Thiobacillus thiooxidans* and its kin *Thiobacillus ferrooxidans* to leach copper from waste dumps in Bingham Canyon. The yield is eighty per cent and the method of microbial leaching has recently been further improved.

But essentially new applications of microbial procedures to industrial production will depend on basic research. Refined methods of selection, gene recombination and induced mutations are under way. The relatively new principle of transformation ranks high on the research programs of many laboratories. This means that the DNA molecule, carrying the heritable information for the specific enzyme activities of a given bacterial strain, can be changed, transformed, by introducing foreign DNA. With present methods small pieces of active DNA have been integrated in bacterial strains which keep and use the new information, eternally.

Such new knowledge will certainly incite research with peaceful, practical goals. Many now impracticable jobs will be left to microbes, even tough jobs like mining. If the hope of leisure whets our appetite for microbial techniques, the food needed for starving human masses prompts us to apply them.

Human populations grow much in the same exponential way as microbial populations. To feed the former with beef produced by feeding cattle with the help of the latter seems to be a somewhat roundabout method. We would come closer to an equitable, dour satiety by abandoning animal husbandry for the cultivation of edible yeasts.

Though this would realize nobody's ideal we may, sooner or later, be pushed to a simple calculation: A heifer weighing eleven hundred pounds produces one pound of protein a day, the same weight of yeast cells produce, in a day, one hundred ten thousand pounds of protein. ■

Table 1. Some microbes used in the food industries

PRODUCT	*Microbe*	Function
STOCK ALE LAGER BEER	*Saccharomyces cerevisiae* *S. carlsbergensis*	Alcoholic fermentation
BAKER'S YEAST	*S. cerevisiae*	Leavening

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CHEESE	*Lactobacillus*, many strains	Starter cultures, clotting
	Streptococcus zymogenes	
	S. thermophilus	
	Propionibacterium shermanii, several species	Curing: holes in Swiss cheese, flavor, consistency, aroma
BLUE CHEESE	*Penicillium roqueforti*	
BUTTER	*Streptococcus lactis*	Starter cultures, to sour the cream
	S. cremoris strains	
	Lactobacillus citrovorum	
	S. diacetylactis	Flavor
FERMENTED MILK		
BUTTERMILK	Same as for butter	Diacetyl production for flavor
ACIDOPHILUS MILK	*Lactobacillus acidophilus*	Souring (& humoring misconceived ideas about intestinal microbial flora)
YOGURT	*Lactobacillus bulgaricus*	Same as foregoing; bacilli produce amino acids feeding the cocci
	Streptococcus thermophilus	
KEFIR	*Lactobacillus casei*	
	Streptococci	Souring
	Saccharomyces kefir	Alcoholic fermentation
LACTASE	*Saccharomyces fragilis*	Lactase, a yeast enzyme, prevents crystallization of milk sugar in ice cream
INVERTASE	*Saccharomyces cerevisiae*	Invertase, a yeast enzyme, is used to make invert sugar, soft-cream-center bonbons and artificial honey
VINEGAR	*Acetobacter suboxydans*	Acetic acid fermentation
	Acetomonas strains	
SAUERKRAUT	*Leuconostoc mesenteroides*	Production of lactic & acetic acids
	Lactobacillus plantarum	
	L. brevis	Production of lactic acid

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PRODUCT	*Microbe*	Function
CUCUMBER PICKLES	*L. plantarum* *L. brevis* *Pediococcus cerevisiae* (salt-tolerant strains)	Production of lactic acid
SHIOKARA JAPANESE FISH PASTE	*Aspergillus oryzae*	Partial enzymatic digestion, ergosterol formation, preservation
LKC-FEED FISH SILAGE	*Lactobacillus plantarum*	Preservation through microbial control
FOOD YEAST FODDER YEAST	*Candida utilis* (*Torulopsis utilis*) *Saccharomyces cerevisiae*	Converting industrial and agricultural wastes to food and cattle feed, yeast cultured for bulk & dried

Table 2. Some widely used antibiotics

GENERIC NAME OF ANTIBIOTIC	*Producing microbe*	Effective against
CARBOMYCIN	*Streptomyces halstedii*	A wide range of disease-provoking bacteria, including those of sore throat, pneumonia, epidemic meningitis, diphtheria; also rickettsiae, i. e. the microbes of typhus and Rocky Mountain spotted fever.
ERYTHROMYCIN	*Streptomyces erythreus*	Bacteria and rickettsiae; the infectious agents of parrot fever and venereal lymphogranuloma.

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OLEANDOMYCIN	*Streptomyces antibioticus*	Wide range of infective bacteria
CHLORTETRACYCLINE	*Streptomyces aureofaciens*	Very wide range of disease producing bacteria and also rickettsiae
TETRACYCLINE OXYTETRACYCLINE	*Streptomyces rimosus*	
GRISEOFULVIN	*Penicillium griseofulvum* " *utricae* " *nigricians*	Fungi infecting skin, nails and hair: Microsporon, Trichophyton, Epidermophyton.
NYSTATIN	*Streptomyces noursei*	Infectious fungi
AMPHOTERICIN B	*Streptomyces nodosus*	Infectious fungi
NOVOBIOCIN	*Streptomyces niveus* " *spheroides*	Wide range of pathogenic bacteria, including those of sore throat
KANAMYCIN	*Streptomyces kanamyceticus*	Very wide range of bacteria, including the tubercle bacillus.
NEOMYCIN	*Streptomyces fradiae*	
STREPTOMYCIN	*Streptomyces griseus* " *bikiniensis*	Wide range of bacteria, including tubercle bacillus; blue mold of tobacco.
BACITRACIN	*Bacillus subtilis* " *licheniformis*	Wide range of common infectious bacteria; the spirochete of syphilis; lock-jaw bacillus.
PENICILLIN	*Penicillium notatum* " *chrysogenum*	Very wide range of bacteria; spirochetes; rickettsiae.
VIOMYCIN	*Streptomyces floridae*	Tubercle bacillus
CHLORAMPHENICOL	*Streptomyces venezuelae*	Very wide range of infectious agents.
CYCLOSERINE	*Streptomyces orchidaceus*	Tubercle bacillus

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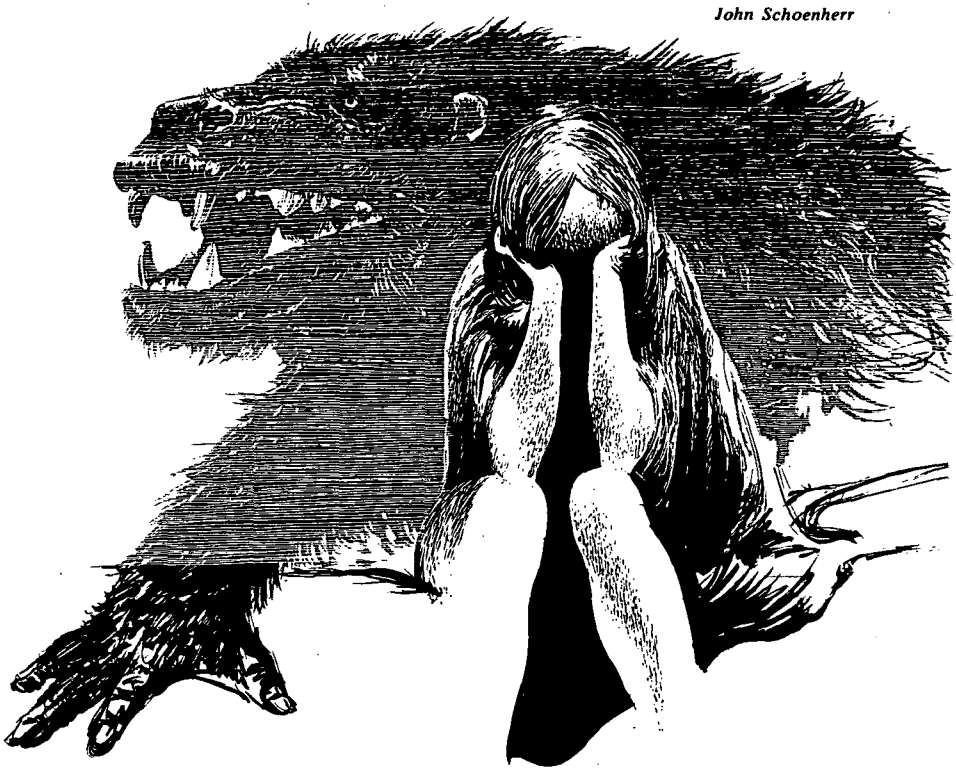

John Schoenherr

Sleep No More

What evidence we have on psi talents indicates that psi and intelligence are independent variables. Telzey found there was one very psi-talented, and very carnivorous beast . . . which wasn't smart, but very alert . . .

JAMES H. SCHMITZ

I, Telzey Amberdon thought, am sitting up in bed—my bed—in my section of duplex bungalow 18-19, Student Court Ninety-two, at Pehanron College. And something happened just now that woke me up. What was it?

She reached back, touched the light panel at the head of the couch-bed. The silent room appeared in softly glowing color about her. Telzey glanced around it, puzzled. It was still an hour before the time she'd normally be getting up. But something had brought her wide

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awake out of deep sleep a few seconds ago—so suddenly and completely that she found herself sitting up on the couch in the act of opening her eyes.

And now she made another discovery. The psi screen about her mind was drawn tight—a defensive reaction she hadn't been conscious of making.

She considered that, frowning.

I was dreaming about Robane again, she remembered suddenly.

She settled back against the pillows, blinked reflectivey at the amber-glowing ceiling.

It was, she realized, the second time within a week that she'd come awake out of a dream about Robane, the maimed half-man, the inventive genius and secret murderer of Melna Park, who had entertained himself by hunting down human beings with a savage beast in the park's forests. Nearly a month had gone by since Telzey had left Robane in his isolated house with part of his mind wiped out—he had made a very bad mistake finally in selecting a psi for his sport. The fact that she had dreamed twice about him indicated simply that she was more preoccupied with Robane at present than she'd been aware . . . but what had there been in this second dream to wake her up so abruptly?

Telzey cast back in her memory, finding fragments of the dream, connecting them, reassembling it. In a minute or two, she seemed to have the pattern. She had planned to go back to Robane's house when the opportunity came; and in the dream; she had done it and he had been telling her about the psi machines he'd designed for himself.

Then there had been something else. What?

The shadows, Telzey thought suddenly.

As she dreamed she talked with Robane, she'd seemed to sense something approaching and she'd looked around and discovered the shadows. That was all they were, formless scraps of darkness. Two or three of them appeared to be standing off in the distance and she had the impression they were watching her. And there was another shadow not far away which seemed to be moving swiftly towards her—

That was what had startled her into waking up instantly, snapping the screening bubble of psi energy shut about her mind as she did it!

And the screen was still shut tight, she realized. She began to relax it, then hesitated. There was the oddest sort of reluctance to open it again! A feeling of fear . . . of the shadow that had been moving towards her, or of something else? She wasn't sure.

She waited a moment, then thinned the psi bubble gradually, carefully, finally let it go. And lay there feeling a little foolish for a moment, because nothing at all significant happened. There was only the usual murmur of psi and

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life energies around, which never became more obtrusive than she wanted it to be—far less obtrusive, in any case, than the normal noises of a city. Her recently gained perceptions in that area were like an additional cluster of senses: she'd become so accustomed to using them now that closing the bubble to the point where it screened them out seemed almost like squeezing her eyes shut or putting her fingers in her ears.

And now, Telzey asked herself, what had been the meaning of the dream?

It might have been a suggestion that she felt guilty about what she had done to Robane. The only thing wrong with that was that she hadn't felt guilty about it for an instant. Robane's murders had to be stopped, immediately; and she could have stopped them in no other way without either killing him or revealing publicly that she was a psi.

Then was she apprehensive that what she had done had been discovered? Telzey considered the possibility, shook her head. She really could see no way in which it *could* have been discovered! Robane himself was not aware that anything had happened to him and had no memory of her. He received no visitors in his isolation in Melna Park; the only people coming to his door were from the airtruck services that brought him his supplies and whatever else he ordered from the world outside. And such people would be unable to tell any difference in Robane, even if—which was unlikely—he let them see him personally. The part of his mind she had deleted was the part which had made him a brilliant, ruthless monster. In the ordinary affairs of life, except for his maimed physical condition, he would appear now simply as an ordinary, rather dull man.

No, Telzey thought, she wasn't worried about discovery. A close acquaintance would know, of course, that Robane had changed; but there was nothing to show how the change had been brought about. She had left no clues. And Robane's previous acquaintances hadn't seen him for some years.

However, an unconscious part of her mind plainly was prodding her about Robane. And she had, as a matter of fact, left some unfinished business there. The human game Robane hunted also had been merchandise, delivered secretly for high pay to his house in the park by a smuggling ring. At the time, there had been too much confusion and excitement to let her dig quietly through Robane's memories for something that would identify that ring. They were criminals who certainly should be brought to justice eventually in some way for what they had been doing.

So she had intended to go back to the house presently—precisely

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as she had done in her dream—to get that information, among other things, from Robane. But it seemed advisable to wait a few weeks first. The fact that a ferocious wild animal—supposedly extinct in that section of the continent—had appeared in Melna Park, had attacked a visiting girl student and undoubtedly would have killed her if her dog hadn't killed it first, had given the Park authorities a black eye. Melna Park was supposed to be *safe* for the public. Everyone had co-operated in playing the matter down; but Telzey's adventure had been mentioned in the newscasts though her name wasn't, and there were subsequent reports that armed park rangers and volunteer sportsmen were combing every section of the park to make sure no other murderous creatures lurked unsuspected in its forests. She had decided it would be better to let things simmer down completely again before she paid Robane another visit. She didn't want to be seen entering his house or to appear connected with him in any way.

There had been an alternate possibility. Telzey wasn't sure she could do it—it would set up a new situation—but conceivably, since she had established a very direct, complete contact between their minds, she might have continued her investigation of Robane's thought and memory processes on the far side of the continent without ever leaving Pehanron College. Again, however, that did not seem a desirable approach, particularly not in this case. She knew there were telepathic eavesdroppers about; and she didn't know just how they functioned and what their aims were. It seemed best to conclude her business with Robane as cautiously and quietly as possible. Which meant going back to the park.

And there was no reason, she thought, why she shouldn't fly back there today after she'd got in her last scheduled lecture in the afternoon. She could register at one of the park hotels for the week end, which would give her two full days if necessary to wind up matters at Robane's house. Then that unpleasant half-man should no longer be disturbing her dreams.

It was that night, in her room at the park hotel, while she was thinking about Robane after dinner, that a distinct feeling of uneasiness began to develop in Telzey. It was a shapeless thing, an apprehension; she seemed physically uncomfortable, as if touched by an awareness that something here was not as it should be. Telzey shook her head irritably, switched on the window screen, went over to it. She stood there a time, looking out. In the cluster-light, Melna Park sloped away, shadowy, vast and primitive, up towards the northern mountains. Robane's house was not in view from here; it lay beyond a turn

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of the mountains and, at the throttled-down pace to which aircars were limited in the park, it would take her a good four hours to get to it from the hotel tomorrow—more than twice the time she had spent crossing half the continent from Pehanron College that afternoon.

The feeling grew in her that behind the mountains Robane was aware of her, knew she was near, was thinking of her with vengeful hatred. Which, Telzey told herself, was impossible. Robane no longer knew she existed. Much less would he have been capable, with what was left of his mind, of remembering what she had done to him. Yet the feeling was difficult to dismiss.

She left the screen finally, dimmed the room's lights and got into bed, wondering at her reactions. The starblaze filled the far end of the room, pouring from the screen. Normally, Telzey liked the effect; tonight it seemed cold and hostile. She reached out presently, found the screen switch on a tiny room-control console beside the bed and turned it off. The darkened room felt more comfortable. Some time later, she fell asleep . . .

. . . And appeared to come awake again almost instantly, in shaking near-panic. She had been back in the park, with Robane's beast on her trail at night; and for some seconds now it was difficult to remember she had seen it dead, its cruel eyes staring blindly, brought down by a killer fiercer than itself. Then Telzey turned up the room's lights, switched on music and lay listening to it, while her heartbeat slowed and steadied. Her psi shield had gone tight again in reaction to the nightmare; and now she left it that way. The music should relax her, she thought.

It didn't. An hour later, she was still wide awake. Exasperated with herself—she almost never had problems of that sort—she got dressed and went down to the hotel terrace where late diners still sat, watching a scattering of couples dance languidly under the starblaze. Telzey sat down at a table and ordered a glass of hot milk. She'd heard hot milk was a good remedy for insomnia. She sipped it slowly, looking around at the groups of park tourists, aware that whatever tensions were in her seemed to be letting up here. By the time she finished the milk, she was getting drowsy, and returned to her room.

But it remained an uncomfortable night. Telzey napped fitfully, woke up again. Something in her simply didn't want to relax; and as soon as she began to fall asleep and the energy bubble enclosing her mind loosened normally, the something protested and brought her awake. It was puzzling and disturbing, and in some way it still seemed associated with Robane and with her purpose here. It would be a good thing to get her business with him over and finished as quickly as she could.

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By daybreak, she was up, feeling fatigued and irritated. But a cold shower opened her eyes; and after she'd had breakfast, she seemed reasonably fresh. Ten minutes later, she was on her way to Robane's house.

It was a warm, breezy prewinter day. Telzey's aircar moved along at the thirty miles an hour to which it was limited by the sealed engine attachment installed when she'd brought it in through a park entry in the evening. Melna Park was famous for the resplendent color changes of the vegetation in its plains and forests as winter approached; the tourist traffic was consequently much heavier today than it had been a month ago. Aircars floated almost everywhere she looked, following the rolling contours of the ground, as her own Cloudsplitter was doing. She had slid the canopy down to let in the sun, and the wind intermittently whipped her hair about her cheeks.

Under such circumstances, it seemed almost impossible to hang on to nighttime tensions. The relaxation which had eluded Telzey at the hotel gradually came to her now—she grew tempted to park the car and settle down for an hour's nap in the sunshine before going on. But it would take her some hours to reach Robane's house, and she wanted to get there early enough in the day to be finished with him before evening. The uneasiness she still felt about the matter wasn't serious, but there was a half-conviction that the reactions she had experienced meant she might run into problems with Robane she hadn't foreseen. The more time she would have available to study the situation before she got into contact with him, the better.

Near noon, she came out into the series of mile-wide plateaus dropping from the point where the great Cil Chasm cut through the mountains to the southern forestland. Robane's house stood at the edge of the forest. Telzey opened a compartment in the car and took out a pair of small, powerful binoculars. After a while, she had the house in the lenses. It looked precisely as it had a month ago—neat and trim; and something was moving in the garden which appeared to be a maintenance robot. So presumably the house was tenanted. One of the notions which had disturbed Telzey was that the park authorities might have become aware there was something wrong with Robane's condition and had him taken away. It had never seemed likely; and it looked less likely now.

She could have sent a thought to him from where she was. But she had most of the day still left, and the remnant of uneasiness made her wary. She had kept her psi screen closed throughout the trip across the park and was in no hurry to open it. Some of the aircars in sight above the plateau were those

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of park rangers; and while they were about she did not want to get too close to Robane's house in any case. For a while, she kept the Cloudsplitter drifting aimlessly over the plateau—one more sight-seeing tourist among the forty or fifty in immediate view.

Then she brought the car down behind a rise which hid Robane's house from her, moved along back of the rise for about a mile and settled to the ground at the edge of a stand of sizable trees. She slipped out of the car, carrying the binoculars, walked up to the top of the rise and across it, threading her way among the trees until she came to a point from which she could see Robane's house without being observed herself.

This was the closest she had come to it today. She held it in the glasses for about ten minutes. The thing moving in the garden was a robotic tending device as she had thought; it was out of sight in some shrubbery for a while, then emerged and began moving back and forth across one of the lawns while a silvery mist arising from the shrubbery indicated a watering system had been turned on in there. Finally the robot trundled to the side of the house, paused before it. A wide door slid open in the wall, and the machine rolled inside.

Telzey put the binoculars down. She had got a look through the door before it closed again. A large aircar stood behind it.

So Robane appeared to be at home. If somebody else hadn't had him removed from the house, she thought, he was almost bound to be. Her mental operation hadn't left him enough initiative to leave the house again for purposes of his own.

And now, she thought, a light—very light and alert—mental probe. Just enough to make quite sure that Robane was, in fact, as she had left him, that there had been no strange—and really impossible—developments in that once-wicked mind which might be connected with her still unexplained anxieties during the night.

Leaning against the sun-warm trunk of a tall tree, just out of sight of Robane's house, she closed her eyes and gradually lightened the bubble of psi energy about her mind, let it open out. She felt the sudden tug of some fear resistance, but the bubble stayed open. The thousandfold blended whispers of life currents on the plateau all about flowed into her awareness.

And everything seemed very normal. Relieved, because she simply hadn't known what she might have encountered at this moment, she flicked a thread of thought down to the forest, to Robane's house, touched for a moment the half-man's familiar mental patterns.

Something like a shout flashed through her mind. Not words, nothing even partly verbalized; never-

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theless, it was a clear, incisive command accompanied by the ring of triumphant, contemptuous laughter. The laughter, the contempt, were directed at her. The command—

During the split instant of shock before she snapped the psi shield shut, tight, hard, she was aware of a blurred image rushing towards her. Then the image, the laughing voice-thought, her glimpse of Robane's mind, were cut off together by the barrier.

Shaking, breathing carefully, Telzey opened her eyes, glanced about. For long seconds, she remained motionless. The trees stirred lazily above her as a breeze rustled through the bushes. But nothing was changed or different, here in the world of reality. What had happened? Exactly what had she run into at Robane's house?

A sound reached her—the rolling thunder of explosion. It faded away.

It seemed to have come from the forest to the south. Telzey listened a moment, licked her lips, moved forward cautiously until she could look out from behind the trees at Robane's house.

A roiling cloud of ugly yellow smoke still partly concealed the area where the house had stood. But it was already clear that the house and the garden about it had been savagely obliterated.

And that, Telzey thought numbly, was in part her answer.

By the time she got back to the Cloudsplitter and lifted it off the ground, she could see a number of tourist aircars gliding cautiously towards the site of the explosion. A moment later, an alerted ranger car screamed down out of the sky, passed over her and vanished. Telzey remained behind the rise of ground along which she had approached for a closer look at the house, moving off to the west. She was almost certain that whoever had blown up Robane in his house was not physically in the area—very likely not even in Melna Park. But there was no reason to expose herself any more than she'd already done. As it was, this might be a very bad situation—

Robane had been used as bait—bait to trap a psi. The fact that he had been destroyed then meant that whoever had set up the trap believed the psi it had been intended for was now caught. In whatever she did next, she would have to be extremely careful.

To start with, who were they? There seemed to be at least two telepaths involved. Telzey brought out the thought-impression she had recorded before shutting her shield, examined it closely.

It was brief but vivid—very vivid. And studying it now, she became aware of a number of details she had not consciously noted in the moment of recording it. This psi was human, must be; and yet the thought-form had almost the sense

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of an alien species about it. She had never felt anything like that in the thoughts of other human psis she had tapped. It had been hurled at her with arrogance, hatred and contempt, as if the psi himself felt he was different from and superior to human beings. Perhaps it was . . . his thought held an impression of force and power which had been as startling to her in that unprotected instant as the sudden, angry roar of an animal nearby.

Blended into that had been a communication—not directed at her and not too clear to her. It was, she thought, the sort of mental short-code that seemed to develop among associated telepaths; a flick of psi which might carry a very involved meaning. She could see the basic meaning here: Success! The quarry was hooked! So he had one or more companions with whom he felt on equal footing. His own kind, whatever that was.

Then the third part, the least clear part of that thought-structure. It had death in it. Her death. It was a command; and she was almost certain it had been directed at the indistinct shape she'd seemed to glimpse in the same instant, rushing towards her. Something that might have been a sizable animal.

Her death . . . how? Telzey swallowed uncomfortably. What had been their connection with Robane? Possibly the one she had come here to investigate. Minds like that should have no objection to delivering one human being to another, to be hunted down and killed for sport. But psis could have other uses for Robane. The half-man's inventive genius might have been at the disposal of a watching mind which set him profitable problems and left him to work them out, not knowing why he did it, in the solitude of Melna Park.

Whatever their interest in Robane, they had discovered what had been done to the half-man and knew that only another psi could have done it in that exact manner. She had sealed most of Robane's memories away but left them intact; and they could guess from that that she intended to be back to search through them for more information. They could have destroyed Robane immediately as being of no further use to them, but they'd wanted the unidentified meddler off their track. Perhaps they were concerned about what she might already know. To psis with something to hide, other psis must present a constant threat of exposure.

So they had set up the trap. Robane's mind was the bait. The telepath who touched it again would spring the trap on himself. And, some twenty minutes ago, cautious and light as her touch had been, she had sprung it.

Immediately afterwards, she had locked the psi bubble around her. Perhaps that had nullified whatever had been planned for her at Ro-

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bane's house. Perhaps, she thought. She had to accept the probability that she still was in the trap—and she didn't yet know what it was.

The Cloudsplitter went gliding at its measured thirty miles an hour across the upper plateaus of the valley, a hundred feet from the ground. The southern forest where Robane's house had stood had sunk out of sight behind her. The flanks of the mountains curved away ahead. Telzey turned the car farther in towards them. Another aircar slipped past at the edge of her vision, three hundred yards away. She had a momentary impulse to swing around again and follow it; to remain near other people. But she kept the Cloudsplitter on its course. The company of others meant no safety for her, and mingling with them might simply distract her attention dangerously.

She returned the car to its automatic controls, sat gazing at the mountains through the windshield. That other impression at the instant of touching Robane's mind—the image, the vague shape like an animal's rushing towards her. Perhaps a hallucination, her own mind's symbol of some death energy directed at her by the waiting psi. At any rate, she had seen it before, though not quite in the same way.

She went over the last section of her dream two nights ago, of being in Robane's house . . . the shadows, several watching in the distance—one moving towards her, until a fright reaction brought her awake, shield closed. During the dream, a tendril of psi might have drifted from her to Robane's mind, too tenuous to spring the trap but enough to begin setting its mechanism in motion. Something in her had recognized that, drawn quickly back.

Her anxieties at the hotel again began after she had been thinking of Robane and her experience with him. Here in Melna Park, the background to that experience, such thoughts could have produced enough contact between them to disturb the trap's mechanism once more. There had been a feeling then that something prowled around in the star-pale night outside, searching for her but unable to find her behind the psi barrier.

Something? Psi energy could kill, quickly, impersonally, directly; it could be used as a weapon by a mind which understood its use for that purpose and was equipped to handle the force it turned on another. But if that was the trap, it seemed to her she would have interpreted it differently—not as a moving shadow, a half-glimpsed animal shape, an image which drifted through the night looking for her.

What else could it be? Telzey shook her head. She didn't know. She could find out; eventually she would have to find out. But not yet.

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She glanced at the watch in her wrist-talker. Give them another hour, she decided. They didn't know her physical identity; but it could do no harm to place more physical distance between herself and the area of Robane's house before she tried anything else. They had caught at least momentary glimpses of her mind—bad enough, but it couldn't be helped now. In that respect, she must have seemed to vanish for them as she closed her shield. It was even possible they believed she had been destroyed by whatever trick they had prepared; and if that was true, she already was reasonably safe again—if she did nothing to bring herself to their attention.

They might very well still be watching closely for her at the moment. But an hour from now, they should be less alert. There was a trick of her own she could use then to determine what the situation was, without much risk of revealing herself.

An hour later, the effects of having passed a nearly sleepless night were more noticeable. Not enough to bother her seriously, but there were moments of reduced alertness and physical lassitude of which she suddenly grew aware. Under different circumstances, she could have ignored that; now, she felt some concern. The nearest park ranger car would have hustled a stimulant over to her if she'd used the car's communicator to ask for it, but she would be in for a period of questioning solicitude then, at the very least. She'd simply have to remain wakeful long enough to make sure she was free of the situation she'd got into through Robane.

The test she had prepared was a simple one. The psi bubble would flash open, instantly be shut again. During that moment, her perceptions, extended to the utmost, would be set to receive two impressions: thought-patterns of the telepath who had laid a trap for her, and the vaguely seen animal shape involved with the trap. If either was still in her mental vicinity, still a menace, some trace of it would be obtained, however faintly. If nothing was there, she could at last, Telzey thought, begin to relax. Unless they were as intently prepared as she was to detect some sign from her, that momentary flicker of psi should pass unobserved.

The bubble flicked open, flicked shut, as her sensitized perceptions made their recording. Telzey sat still for a moment then, feeling the drumming of fear.

Slowly, like an afterimage, she let the recorded picture grow up again in her awareness.

A gray beast shape. What kind of beast it represented she didn't know. Something like a great, uncouth baboon—a big heavy head, strong body supported on four hand-paws.

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As the bubble opened, she'd had the feeling of seeing it near her, three-dimensional, every detail of its structure clearly etched, though it stood in a vague nothingness. The small red eyes stared in her direction. And short as the moment of exposure was, she was certain she'd seen it start in recognition, begin moving towards her, before it vanished behind the barrier again.

What was it? A hallucination—a projection insinuated into her mind by the other psi in the instant of contact between them, something she was supposed to develop to her own destruction now?

She didn't think so. It seemed much too real, too alertly, menacingly, alive. In some way she'd seen what was there—the vague animal image she'd glimpsed before, come close and no longer vague. In physical space, it might be hundreds of miles away; or perhaps it was nowhere in that sense at present. In the other reality they shared, it hadn't lost her. While she was concealed behind the psi barrier, it had waited; and at each brief new impression it received of her mind, it had moved "closer" again. What would happen when, in its manner, it reached her, touched her?

She didn't know the answer to that. She let the image fade, began searching for traces of the psi-mind associated with it. After long seconds, she knew nothing had been recorded in her perceptions there. The psi was simply gone. He had drawn her to his trap, set the creature on her, then apparently turned away to other matters—as if confident that nothing more needed to be done at present.

The thought was briefly more chilling than the waiting beast image. But if it was only an animal she had to deal with, Telzey told herself, escape might be an easier matter than it would have been if minds like the one she had encountered had remained on her trail.

Nevertheless, the animal seemed bad enough. She had never heard of a creature which tracked down prey by sensing mental emanations, as this one evidently did. It must be native to a world not generally known in the Hub; and she could guess it had been imported here with the primary purpose of turning it into a hunter of human psis—psis who could be a problem to its masters. It knew about psi barriers. Either it had dealt with those in its natural state, too, or it had been trained to handle them. At any rate, it seemed quite aware that it need only wait, with a carnivore's alert patience, until the quarry's shield relaxed. As her bubble would relax eventually. She couldn't stay awake forever; and asleep she didn't have enough control of the barrier to keep so steady and relentless a watcher from detecting occasional traces of her mental activity.

It had been a trap in two ways then. If she'd simply gone to Robane's house, hadn't taken the pre-

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caution of checking first, she would have vanished in the explosion with him. Since she had checked, they'd set this thing of theirs on her. It would keep her inside her psi barrier where she couldn't try to keep track of what they were doing now, and it was intended to force her into behavior which would reveal to them who she was as an individual and where she was. If they knew that, they could use some very ordinary method to dispose of her.

They would assume she was somewhere in Melna Park, though they couldn't be sure of it. There were no psis like the one whose thought-impression she had studied in the area at present; but he and others might be on their way there now. Before they arrived, she had to be free of their animal—they were making use of its specialized psionic ability to keep in contact with selected prey as men long ago had learned to turn the sharper senses of the dog to their own advantage.

And, very simply, she had to be free of it before she became too sleepy to hold it off any longer with the barrier.

Some months before, she had encountered a telepathic alien creature which had attempted to kill her with a bolt of psi energy and had, in fact, very nearly succeeded. She had got rid of that one readily enough, almost frightened it to death, by drenching its mind with thoughts of pure, black hate. Perhaps the method would be equally effective with the baboonlike thing, though the glimpse she'd had of it suggested it was a far more formidable animal all around and one that would not be at all easy to discourage. Besides, discouraging it shouldn't be enough this time—the probable result would be that she would find it put on her trail again on another occasion, and rather soon. But shaking it off temporarily at least would give her the opportunity to prepare a better defense against both it and its masters. If she couldn't think of another solution, she should make the attempt.

Ten minutes later, she hadn't thought of anything better to do. The Cloudsplitter was drifting up a wide valley into the higher ranges of the park; a touch of chill was in the breeze and there were fewer tourists around. At the moment, she could see only two or three other aircars ahead.

Telzey assembled the hate pattern carefully—not too difficult to do; she was coldly afraid, and fear could be twisted into anger and focused in hatred on those who caused it. She let the feeling build up until she was trembling with it, holding it aimed like a gun, then opened the bubble.

Almost instantly, seeing the gray shape plunging at her through the nothing-space of psi, small pig-eyes glaring red above the gaping jaws,

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she knew that on this psi-beast it wasn't going to work. The hate-thought had found no entry point; she wasn't touching it. But she held the thought as the shape rushed up, snapped the bubble shut before it reached her—immediately found herself slewing the Cloudsplitter around in a sharp turn to the left as if to avoid a physical collision. There was a sound behind her, a deep, bubbling howl, which chilled her to the heart.

Glancing around, she saw it for an instant, twenty feet back of the car—no mind-image, but a thick, powerful animal body, plunging head downward, stretched out as if it were diving, through the air of Melna Park. Then it vanished.

It wasn't really a telepath, she thought—that was why she hadn't been able to touch it. It had a psi-sense through which it could trace out the minds of prospective victims, draw "close" to them; and it had the psi-ability to flick itself through space and appear beside them when it knew by the mind-contact where they were. For the kill it needed only physical weapons: the strength of its massive body, its great teeth and the broad flat nails of the reaching paw-hands which had seemed only feet from her when the bubble shut them from view. If she hadn't swerved sideways in that instant, the thing would have crashed down into the car, and torn the life out of her moments later.

A kind of dullness settled on her now, composed partly of increasing fatigue and partly of a puzzled wonder that she really seemed able to do nothing to get away from this thing. It was some minutes before she could push the feeling aside and get her thoughts arranged again into some kind of order.

In one way, her experiment with the animal might have immediately increased the danger. Its dip through space seemed to have confused it momentarily; at any rate, it had lost too much contact with her to materialize near her again, though she didn't doubt it was still very close mentally. There were moments when she thought she could feel its presence beyond the barrier. But the danger lay in the fact that it might have seen her, or at least the car, in that instant. She didn't think it was intelligent enough to communicate such discoveries to its masters; but the masters, from what she had seen of them, could be quite capable of scanning the mind of such a creature. She had to count on the possibility that they would obtain an adequate description of her through that method at any time now.

Though they might, Telzey thought, actually not care at this point whether they had a description of her or not. She would have to keep out of sight until she was sure about that. But the way the matter had been handled showed

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this was not a new situation to them. Other psis had been caught in the same trap and died in it. If they felt they could trust their animal to conclude the matter—and perhaps they could—the details of the end might be of no great interest to them.

It all hinged just now, in any case, on whether she could escape from the animal. It probably was not even a very intelligent animal; a species with its abilities and strength would not need much mental equipment to get along in its world. But she was caught in a game which was being played by the animal's rules, not hers; and so far she had found no way to get around them.

Some time past the middle of the afternoon, she edged the Cloudsplitter down into a cluster of thickets on sloping ground, brushing the vegetation aside until the car was completely concealed. She shut off its engines and climbed out, stood swaying a little unsteadily for a moment, before she turned and pushed her way out of the thickets again.

If she'd remained sitting in the car, she would have been asleep in minutes. If she stayed on her feet, she might gain another fifteen or twenty minutes to attempt to work out an immediate solution. Then she would have to call the park rangers on the car's communicator and ask them to get a fix on her and come to her help. Stimulants could keep her awake for another day, perhaps longer. But in doing that, she thought, she would start a chain of events which almost certainly must end in her destruction. If the beast didn't finish her, the psis would be there to do it. For all she knew, they already were searching the park for her.

To try to keep awake on her own for another fifteen or twenty minutes might be equally fatal, of course. The thing was *near!* Half a dozen times she'd been on the verge of drifting off to the point where outside reality and the universe of psi seemed blended, had been jolted awake by a growing sense of the psi beast's presence.

Getting out of the car and on her feet had roused her a little. The cold of the mountain air had a further stimulating effect. She'd come far up into a region of the park which already seemed touched by winter. It was, she thought, at least twenty minutes or so since she'd last seen a tourist car or any other indication of the presence of humanity on the planet.

She stood rubbing her arms with her hands to warm them, looking around. She was above a rounded dip in the mountains between two adjoining ridges. Thin, brown, hip-high grass and straggling trees filled the dip. A narrow, swift stream wound through it. She'd grounded the car three quarters of the way up the western side. The far side was a flat, almost vertical gray rock

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wall, festooned with yellow cobwebs of withering vines. That half of the dip was still bathed in sunlight coming over the top of the ridge behind her. Her side was in shadow.

She shivered in the chill, shook her head to drive away a new wave of drowsiness. She seemed unable to concentrate on the problem of the psi-beast. Her thoughts shifted to the sun-warmed rocks she had crossed at the top of the ridge as she turned the Cloudsplitter down into the little valley.

She pictured herself sitting there, warmed by the sun. It was a convincing picture; in imagination she felt the sun on her shoulders and back, the warm rock beneath her, saw the dry, thorny fall growth—

Telzey's eyes flickered, widened thoughtfully. After a moment, she brought the picture back into her mind.

I'm here, she thought. I'm sitting in the sun. I'm half asleep, nodding, feeling the warmth, forgetting I'm in danger. The wind blows over the rocks and the bushes are rustling all around me.

She opened the psi bubble gently —"I'm here, Bozo!"—closed it.

She stood in the shadow of the western ridge, shivering and chilled, listening. Far above, for a moment, there had been noises as if something plunged heavily about in the thorny growth at the top of the ridge. Then the noises had stopped abruptly.

Telzey's gaze shifted down into the dip between the ridges, followed the course of the little stream up out of the shadows to a point where it ran between flat sandy banks.

And now I'm *here,* she thought. Sitting in warm sand, in the sun again, now sheltered from the wind.

The shield opened. For an instant.

"I'm here—"

Looking down from the shaded slope, barrier tight and hard, she saw Bozo the beast appear in Melna Park for the second time that day, half in the stream, half out. Its heavy head swung this way and that; it leaped forward, wheeled, glared about, plunged suddenly out of sight among the trees. For an instant, she heard its odd howling voice, like amplified drunken human laughter, but furious with frustrated eagerness.

Telzey leaned back against the tree behind her, closed her eyes. Drowsiness rolled in immediately. She shook her head, drove it back.

Darkness, she thought. Darkness, black and cold. Black, black all around me—because I've fallen asleep, Bozo. Now you can get—

Blackness closed in on her mind like a rush of wind. The bubble-shield slipped open.

"Bozo! I'm HERE!"

In the blackness, Bozo's image flashed up before her, huge, jaws wide, red eyes blazing, gray arms sweeping out to seize her—

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The bubble snapped shut.

Eyes still closed, Telzey swayed against the tree, listening to the echoes of the second explosion she had heard today. This one had been short and sharp, monstrously loud.

She shook her head, opened her eyes, looked across the dip. The cliff face on the eastern side had changed its appearance. A jagged, dark fissure showed in it, beginning at the top, extending halfway down to the valley. Puffs of mineral dust still drifted out of the fissure into the open air.

She had wondered what would happen if around four hundred pounds of solid animal materialized suddenly deep inside solid rock. She'd expected it could be something like this. This time, Bozo hadn't been able to flick back into no-space again.

"Good-by, Bozo!" she said aloud, across the dip. "I won't miss you."

That had been one part of it, she thought. And now the other.

The psi bubble opened again. And now it stayed open—one minute, two minutes, three—as her perceptions spread out, across Melna Park and beyond, searching for impressions of the psi-mind that had laughed at her in hatred and contempt, cursed her with Bozo, long, long hours ago, at Robane's house.

And there was nothing. Nowhere around here, for many miles about, was anyone thinking of her, giving her any attention at all.

Then you're too late, she told them. She turned, stumbling a little, her balance not too good at the moment on the rocky ground, and pushed her way back through the bushes to the point where she'd left the Cloudsplitter parked. A minute or so later, she'd lifted the little car above the ridges, swung it around to the south. Its canopy was closed and she was luxuriously soaking in the warmth of its heaters. She wanted to go to sleep very badly now, but there was one thing still to be done. It was almost finished.

One section, a tiny section, of her mind was forming itself into a psionic alarm system. Forevermore, it would remain on guard now against psi-minds of the type which had nearly trapped her for good. At the slightest, most distant indication that minds like that were about, long before she became consciously aware of them, her bubble would close automatically and she would know why.

She felt the process complete itself, reached over and set the Cloudsplitter on the automatic controls which would take it back down through the mountains into the warm southern areas of Melna Park to drift along with the other tourist cars. Later, she thought, she could start wondering about those minds and what might perhaps be done about them. Later—

She slumped back gently in the car seat and was instantly asleep. ■

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FIGHTING DIVISION

RANDALL GARRETT

Illustrated by Leo Summers

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As everybody knows, "In Union there is Strength." Yeah—and sometimes everybody's wrong!

I would rather have one good fighting division than a full army corps of untrained, unsure, vacillating troops, however well-meaning their intentions might be."

Douglas MacArthur

Braden Kane slammed the palm of his hand on Senator Nordensen's desk with a sound like a pistol shot. It cracked out and echoed back from the paneled walls of the room, but was quickly smothered by the heavy, old-fashioned velvet drapes that covered the windows.

"*Damn* it, Senator!" His voice seemed to have the same pistol-shot quality. "There's your evidence! Treason! Not just high misdemeanors; not just misfeasance, malfeasance, and nonfeasance, but *treason!* He's giving this country over to Asia just as Sol has sunspots!" Kane pulled his hand back off the desk top. "And yet you just sit there as though I'd told you it might rain tomorrow."

Senator Edgar Nordensen was a big, broadly-built man in his mid-fifties, a heavy punisher of expensive, custom-made shoes. He had folded his hands on the desk before him and looked up at Kane through deep blue-gray eyes. He said: "You get too excited, Kane. You have a tendency to run off at the mouth first and think about it afterwards. What do you expect me to do with this information?"

"*Do* with it? Why, give it to the press! Give it to the Senate! Get him impeached before it's too late!"

"Calm down. And shut up." The senator leaned back in his chair. "Sit down and try deep-breathing exercises; they may help you to think. Do you know what would happen if I gave this stuff to the press?" He indicated a big folder on his desk. "Or to the Senate? It's not easy to impeach the President of the United States, Kane. Oh, this evidence would raise Hell, all right. Eventually, there might be an impeachment brought. But can you imagine the turmoil this country would be in, in the meantime? Do you think we can afford that at this dangerous time? We are prepared for war, Kane; all-out, total, cataclysmic war; the damndest war this planet has ever seen. We have stuff today that makes the armaments of the Cold War, back in the Sixties, look like firecrackers pretending to be hand grenades.

"If we tell the public, in the midst of all this, that the President is plotting treason, the tension will be a thousand times worse than it was a month ago. Tell them that

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this invasion from space is a phony, and all Hell will be out for noon."

"And if we *don't* tell 'em," Kane said sharply, "the President will have this country amalgamated with the Asian Bloc, and they will have taken over this country without a shot being fired."

"How do you know that's what he has in mind?"

"Bah! Can you think of any other reason for getting all buddy-buddy with the Asian Premier on the basis of a threat he *knows* to be false? And the Premier is here in Washington right now, just waiting for this sweetness and light to come about. You can bet your life that *he* knows this threat is phony, too."

"That's one part of it we have no proof of," the senator said. "Not one iota of proof. If we gave this thing out now, just as it is, it would do a thouand times more harm than good."

"Are you going to let it just ride, then?" There was utter astonishment in Braden Kane's voice.

"Don't be silly! Of course not! You're the best investigator I've ever had on my staff, Kane, but this has got you into a tizzy. What we're going to do is think about it. Think! Understand? Nothing's going to happen before tomorrow, so get some sleep. Tomorrow, we'll make plans on some way to use this stuff without blowing the world sky-high and ourselves with it. Meanwhile, go to bed and think about being Attorney General after the next election; that should put you in a more reasonable state of mind."

A wry smile came over Braden Kane's face, and he showed a visible effort to force himself to calmness. "I'm sorry, Senator," he said after a moment. "I realize I shouldn't let myself get worked up that way. My apologies."

"Unnecessary. Now go home. Be here at nine tomorrow morning."

Senator Edgar Nordensen himself did not take the advice he had given his aide. Instead of sleeping, he thought. And an hour later he was wearing a light topcoat, walking toward 1600 Pennsylvania Avenue, a bulky attaché case in his hand.

Once he stopped at a newsfac vendor, dropped in a coin, and waited a few seconds while the machine light-printed a copy of the Washington *Bulletin*. Then he pulled it out of the dispensing niche and read it while he walked on.

ALIEN FLEET STILL DECELERATING BEYOND SATURN ORBIT

"Still No Visual Contact," say Observatories.

Senator Nordensen skimmed through it rapidly to see if there was anything new. There wasn't. The situation was as it had been three hours previously.

He looked at the article headlined UNIFIED DEFENSE COMMAND. Nothing there, either, except that a bulletin was "mo-

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mentarily expected from the White House."

After making sure that the situation, publicly at least, was unchanged, the senator folded the newsfac and slipped it into the side pocket of his topcoat. By that time, 1600 Pennsylvania Avenue was only two blocks away.

The newsmen who saw him walk up to the gate made notes, and one of them asked him a question.

The senator smiled. "I don't know anything more than you do, boys. Maybe less. No comment on anything else."

They shrugged in a friendly fashion and went on waiting. Even the arrival of the leader of the Opposition Party was of little moment at this time.

The Secret Service guard at the gate was not so easy to deal with. "I'm sorry, Senator," he said respectfully, "but I have no orders pertaining to you. The President does not wish to be disturbed."

The senator took an envelope from his inside coat pocket. It was addressed to the President of the United States and was marked PERSONAL AND URGENT. "See that he gets this immediately. I'll wait here until he's read it."

"But, Senator, it's after ten o'clock!"

The senator raised an eyebrow. "Emergencies have a habit of not paying any attention to what the clock says. Your job is to guard the President; mine is to help run the country. I suggest you do your job without interfering with mine, son."

Ten minutes later, Senator Nordensen was being shown into the President's office.

"Good evening, Mr. President," he said formally, taking the hand the Chief Executive offered.

"Good evening, Senator. Take off your topcoat and have a seat. Would you like something to drink?"

"Not just now, thank you, Mr. President. Later perhaps." The senator settled himself into the proffered chair and the President sat down behind his desk.

"Your letter, Senator," said the President in a formal but still friendly tone, "was a little disturbing—as, of course, you intended it to be. Still, I appreciate your couching it in terms that only I would understand."

"Thank you, Mr. President."

"What is it you want, Senator? An explanation?"

"Not . . . just yet, Mr. President. Let me tell you what I know first. Perhaps there won't be any need for explanations."

The President was surprised, but only the faintest trace of it showed on his face. "Very well. Go ahead."

"I don't want to take up too much of your time, sir, but I want to show you how my own thoughts ran. I want to present not only my evidence but my reasoning. So if I repeat facts of history that every

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schoolboy knows, I ask your indulgence; I won't do it more than necessary."

"Senator, at a time like this, clear thinking is necessary. If you feel it worthwhile to explain to me why the Fourth of July is a national holiday, I shall listen carefully, I assure you." There was not one iota of irony in his voice or manner.

Senator Nordensen chuckled. "Thank you, Mr. President. I won't need to go back quite that far, nor be quite that explicit.

"However . . . when you started your first term in office, the world was at peace. Oh, we were still having the African Brush Wars; but that was only to be expected, the way Africa is divided into so many little squabbling states. But the threat of Armageddon hadn't hung over us for nearly fifteen years. Nuclear disarmament and free inspection by both sides. The Cold War had been over for a decade and a half. We had a happy, peaceful world, even without a World Government.

"Then came the Guadalcanal Incident. The Asians had secretly built a nuclear testing lab there. Something went wrong and the island was half destroyed and wiped clean of life. It was like Krakatoa all over again, except that the radioactivity left no doubt about the cause of the explosions, even though there was no evidence left.

"Of course, the Asians denied it, said it was *our* doing, not theirs, but I choose to believe our own reports. I know how the Asian mind works.

"That was six years ago, and things have been going steadily from bad to worse at an accelerating pace. No more inspections; nuclear buildup; spacecraft with inertiogravitic drives being fitted as launchers for space torpedoes with thermonuclear warheads. The situation had become about as touchy as dry nitrogen iodide."

The senator stopped, frowned, and looked at the President intently. "You and I are on opposite sides of the political fence, Mr. President, but we know and . . . I hope . . . respect each other."

The President nodded. "I have always respected your honesty and integrity, Senator, even when I disagreed with your viewpoint."

"Thank you. And I may say the same. Also, I've been in politics long enough, and been involved in top-level government long enough, to know what a burden the past six years has been to you."

"Does it show?" the President asked wryly.

The senator smiled. "We all get older, sir. It's just that Presidents of the United States are in a position to do it faster than the rest of us." His smile faded. "Trying to stave off Armageddon is, in the long run, a man-killing job, Mr. President."

There were several levels of meaning in that sentence, and both men recognized them.

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The President nodded slowly. "Yes. Yes, it is."

"I think you may have hit upon a solution," the senator said abruptly, "but I am not yet certain how good it is. If you're found out, you'll be sunk without a trace. Things will be worse than before. And I, personally, don't see how you can escape being found out."

"Go on." The President's voice was level.

"Six weeks ago, according to reports, a spaceship of unknown manufacture, reportedly having been already spotted decelerating from just below light velocity, attacked one of our Moon bases. The torpedoes it sent were intercepted and detonated. It then attempted to attack an Asian base a thousand miles away and was destroyed by an Asian space torpedo. Since then, the radio observatories have announced that there are a dozen more ships coming in. Since the first one attacked without warning, it is assumed that the others will do the same.

"Because of this threat, all thought of international conflict has vanished. We are co-operating wholeheartedly with the Asians, and they are working with us. The Premier is here in Washington at this moment, working with you on an agreement that will practically give, *in toto*, control of the combined armed forces of the civilized world into the hands of a Unified Command. The Secretary General of the European Coalition is expected to land tomorrow and is expected to concur. A meeting of the Prime Ministers of the British Commonwealth has already agreed to let the Prime Minister of Canada act as their ambassador with plenipotentiary powers, and he will be here at about the same time as the European Secretary General.

"Unless certain information—which I have—comes to light, the treaties and agreements will be made. The Senate will almost certainly back you unanimously in validating the treaties.

"We will then have a unified world for the first time in history. Mankind, with its collective back presumably to the wall, will be ready to fight a truly alien enemy. All very fine.

"But, Mr. President—*what are you going to do when that enemy doesn't show up?*"

After a pause, the President said mildly: "What makes you think they won't show up, Senator?"

"Please, Mr. President," the senator said, a pained expression on his face. "Let's not play games. I told you I had evidence. More than evidence; it is proof. You know and I know that that attack on the Moon was rigged. That 'alien ship' was one of our own, robot controlled, and set up to make a realistic but nondamaging attack and be destroyed in the process. If the Asians hadn't got it, we would

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have. Do you deny that, Mr. President?"

A long moment, then, with a sigh: "No. No, Senator, I do not deny it. What you say is true. The attack was a phony."

"All right. Fine. We understand each other, then," the senator said. "I think the idea was brilliant. Practically overnight our internal differences were forgotten in the face of this threat. As I say, the idea was brilliant. But I am not so sure about the execution of that idea. Where do we go from here?"

He held up a hand. "Now, wait, Mr. President. Before you say anything more, let me assure you of one thing. I give you my word that I will never use this politically. I lost the election to you last time, but only by a small margin. I think my party will nominate me again next time, and you can't run a third time. Furthermore, I don't think there's a man in your party now who can beat me at the polls. Do you?"

"Personally," said the president cautiously. "I will concede that. Publicly, I could name half a dozen men who could carry us to glorious victory. Go ahead and make your point."

"All right. I intend to be the next President of the United States. But I give you my word of honor that I will never use the information I have as a political weapon . . . *unless*—"

"Unless?"

"Unless you bungle it yourself. That will, of necessity, force my hand. But it may also mean that Armageddon will come at last, and there will be no United States left for me to be President of. All ambition aside, Mr. President, I don't think I should care to lose the United States.

"Now, I cannot believe that you, with your brilliance, have actually put yourself into the blind alley that you seem to be in. But I like to think that my own mind is not altogether a dull one, and I can't see what your out is.

"You have rigged a phony attack. You have, on the basis of that phony attack, brought about the unification of Mankind, a project with which I am in hearty agreement.

"But it seems to me that you have overreached yourself. The incoming fleet is supposed to be approaching. People are going to wonder why it never gets here. Surely you don't intend to have a skirmish with a dozen robot-controlled spacecraft, which will be wiped out with ease?"

"No."

"Mr. President, I admit that I do not know all the facts. I should like very much to know them. I assure you of my co-operation—one hundred per cent—but I must know how I can help. I must know the facts."

"Senator," the President said firmly, "you'll get them. But first I

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will have to tell you something that may upset you just a little."

"Which is?"

"That the facts you have are correct, but the theory you have based on them is all wrong. I am not quite the altruist you think I am."

Senator Nordensen blinked. Was Kane right, after all? Was the President actually plotting treason? Was he plotting a short-term threat solely in order to turn control of the United States over to the Asians? Ridiculous! And yet . . .

"I engineered a war threat, all right," the President went on, "but not the one you think I did. And let me assure you that we are going to have a war on our hands, but not the one you think we will.

"Let's go back to the Guadalcanal Incident. In fact, to just a little before that.

"I am no scientist, Senator; you have had more training in that field than I. But I think I have my facts straight.

"Shortly before the Guadalcanal Incident, one of our Lunar observatories, checking interstellar gamma radiation, picked up a peculiar source of radiation coming from the direction of the constellation of Scorpio. No Earthside observatory could have detected the radiations because of the blanketing effect of the atmosphere. After a little time, the scientists deduced what was causing the radiation.

"Imagine a body traveling at a velocity very close to that of light. The hull of the ship—and God only knows what those hulls are made of!—strikes the hydrogen atoms that are found everywhere, even in interstellar space. The result, at those velocities, is the same as proton bombardment in a synchrotron or other such particle accelerator. You get gamma radiation.

"The change in wave length indicated that the source was decelerating, and, furthermore, that the deceleration would bring the object to a stop relative to the Solar System. That information was reported directly to me, of course. I asked that it be kept under wraps for a while, until the Lunar Naval observatory could be more certain of its facts. Shortly thereafter, the object ceased to radiate. Its velocity had dropped low enough so that it no longer struck the hydrogen atoms with sufficient force to cause nuclear reactions.

"What added to the confusion at the time was a fainter source of radiation from the same area. The scientists were uncertain of their previous analysis.

"Then the scout ship landed."

"Scout ship?" The senator's mind was still trying to adjust.

"That's what it was. A scout ship in advance of the main fleet. Not six weeks in advance, but six *years* in advance.

"The alien ship managed to foul up our radar somehow. It was near-

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ly twenty hours before we got word of what was happening on Guadalcanal, where they landed.

"Senator, we don't know yet what they used, but they killed every living thing on that island with the exception of themselves. Every man, woman, and child. Every bird, every beast, every insect, every plant. All died.

"The Asian Premier got me on the Hot Line, and we gave joint orders to certain selected units.

"We hit Guadalcanal with seven thermonuclear bombs.

"*That,* Senator, was the Guadalcanal Incident."

"My . . . *God!* But, then we were at war with the aliens six years ago! Why didn't you announce it? Why all this—" He stopped himself abruptly and his eyes changed. "Oh. I see."

"Certainly," said the President. "What would have happened? We were not prepared for war. We had exactly three more bombs between us. Peace, it's wonderful, but it wasn't worth a damn to us just then."

"Just what did you do, Mr. President?"

Instead of answering, the President of the United States looked over at a door that led into an adjoining room. "Would you please come in, Mr. Premier?"

The door opened, and the Premier of Asia came into the President's office. Almost automatically, Senator Nordensen rose to his feet.

He smiled a little as he took the Premier's outstretched hand. "I'm pleased to meet you, Mr. Premier. So you gentelmen had the room bugged, eh?"

"Your President and I have worked together for six years, Senator," the Premier said with a heavy Russian accent. "We each need to know what other is doing. Is necessary for efficiency."

"That's the way we've *had* to work," the President said as the other two seated themselves.

"What would have happened if we had announced an impending invasion from interstellar space at that moment?" the President went on. "What proof did we have? We had blasted the scout into radioactive plasma. We had only one indication, and that was a funny gamma source in Scorpio. What would that mean to the average man? Oh, we could have gotten something started, but would anyone have really had their heart in it?"

"Was exactly same with my people in Asia," said the Premier. "Is impossible to work up to fighting pitch against enemy which remains theoretical."

"So you agreed to disagree?" the senator said.

"Exactly," said the President. "Neatly put. It was the Cold War all over again, only more so. I called the Premier a dirty Communist . . ."

"And I retaliated by calling President dirty Capitalist," the Premier

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said with a grin. "Is very effective. Is kind of war people can understand instead of unbelievable space opera."

"And we had it under control," the President explained. "We both knew that no matter how close to boiling our new Cold War got, it could not boil over because we were holding the lid down." He smiled at Senator Nordensen. "The election three years ago gave us a tough time, I'll admit. If you'd won, as you very nearly did, it would have been you, not me, who would have been helping the Premier sit on that lid. Fortunately, I was sure you would be able to handle it. If Fenner had won your party's nomination, though . . ."

The senator winced. "Ugh. Let's not think about it."

"*He* was calling me dirty names *before* Guadalcanal Incident," the Premier said with a reminiscent smile. "Not *kulturny,* that one."

"Anyhow," the President said, "we managed. What's your opinion now, Senator?"

"I'm still frightened," Nordensen said. "More than ever before. But not of the same thing.

"I think you did right. Both of you. How else could we have jacked the taxes up so high to take care of these enormous expenditures? A few gamma rays from the stars couldn't have made Congress vote those taxes and those hellishly high budgets. To say nothing of re-enacting the draft law."

"If I had tried taxing Asia so greatly," the Premier said, "Grand Presiduum would have found nice home in Ukraine for me to retire to. And Vladisensky? Is almost as bad as Fenner." His slightly Oriental eyes narrowed at the thought.

" 'United we fall, divided we stand,' " the senator misquoted.

"Precisely," agreed the President. "As it is, we are armed to the teeth with every weapon we know how to build. We still may not win, but we'll give them a Hell of a good show for their money."

"Only one thing," the senator said. "Braden Kane knows about the phony attack on Luna. I agree that it was necessary in order to give us some preparation. The people are eager to believe in it now, since it is a reilef from the threat of global war. But Kane is convinced you're a traitor—and I don't think Kane would understand the truth. He isn't capable of it."

"Can you hold him back for three days?"

"Yes. Why three days?"

"You have mentioned Armageddon before, Senator. In three days, Armageddon will begin. After that, it won't matter what Kane says."

The senator closed his eyes. Then he made another misquotation.

"As Tiny Tim says: 'God help us, each and every one.' " ■

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TRADER TEAM

POUL ANDERSON

Second of Two Parts. The trouble was, Brains didn't have initiative, Beauty got jailed, Brawn was lost, and Business got the business—kidnapped by the localites. The Trader Team Was consequently anything but an effective team . . .

Membership in the Polesotechnic League did not stop the merchant princes from cutthroat competition with each other. Nicholas van Rijn of the Solar Spice & Liquors Company stole a march on his rivals by his secret invention of the trade pioneers. These were crews which would look for promising new planets, gather basic knowledge about them, make preliminary commercial agreements with any natives, and then send for the factors who were to establish regular trading posts. The whole thing was to stay hushed up so that Solar would have a monopoly.

The original trade pioneer gang numbered three. David Falkayn was a younger son of a baronial family on human-colonized Hermes. Adzel was a huge, dragon-like native of Woden, but also a pacifistic convert to Buddhism. Chee Lan of Cynthia was small, silky-furred, and peppery. Next to money, their greatest mutual interest was poker. Aboard their ship Muddlin' Through *they programmed the computer to play with them for IOU's which averaged out in the course of a mission.*

Ikrananka was their first important discovery. This was a dry,

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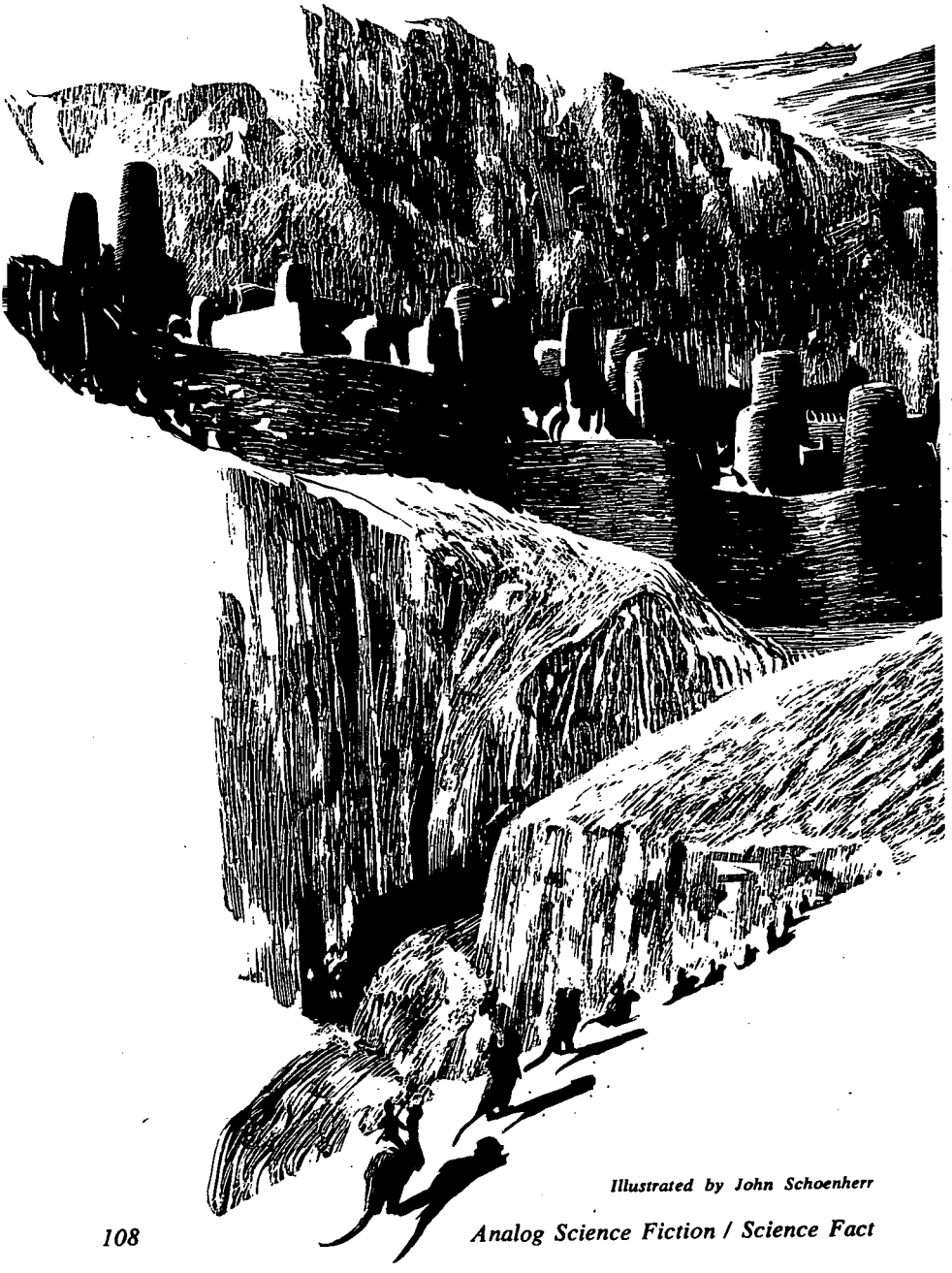

Illustrated by John Schoenherr

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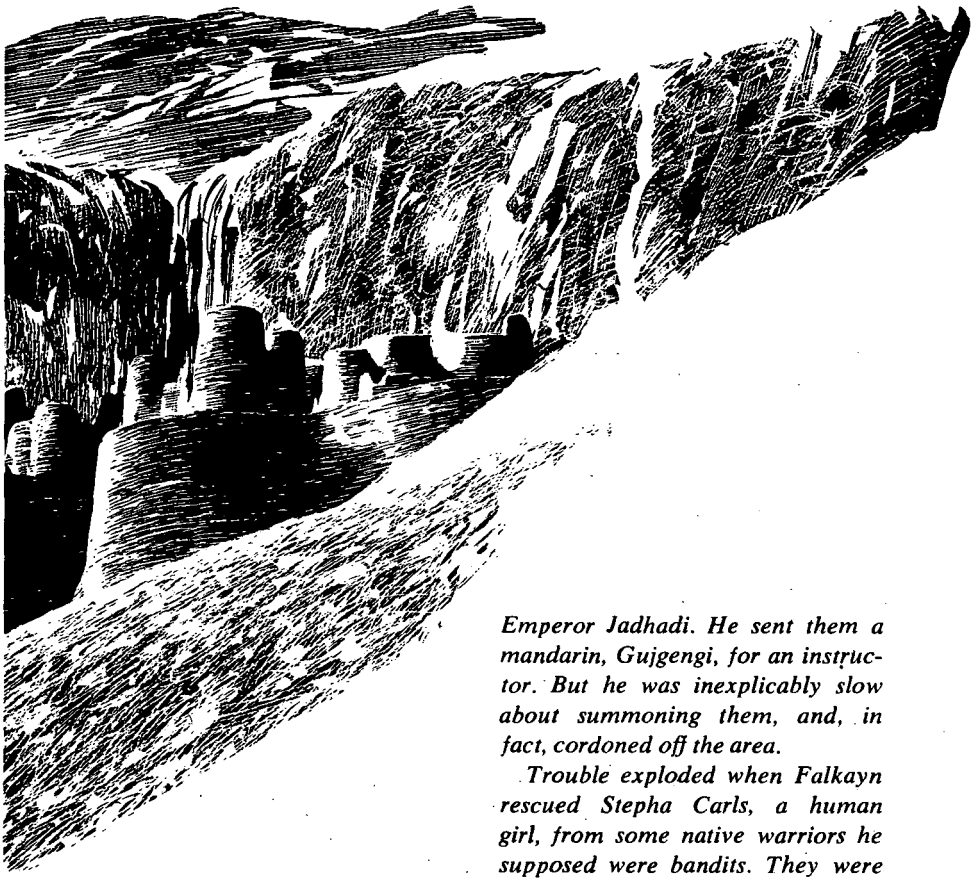

chilly world, eternally facing its red dwarf sun; but it was humanly habitable and could produce much of commercial value. The most advanced nation there, certainly the biggest, seemed to be an empire ruled from the city of Katandara. But the ship landed in the boondocks near the village Haijakata. There the crew studied the language and gathered facts they would need before negotiating with Emperor Jadhadi. He sent them a mandarin, Gujgengi, for an instructor. But he was inexplicably slow about summoning them, and, in fact, cordoned off the area.

Trouble exploded when Falkayn rescued Stepha Carls, a human girl, from some native warriors he supposed were bandits. They were actually Imperial soldiers, and she had come here in violation of the quarantine. She told him that she belonged to the Ershoka, descendants of colonists bound elsewhere several generations ago, marooned on Ikrananka by pirates. Like every phratry in the Empire, they had become specialists—in their own case, soldiers, because even their women were bigger and stronger than any of the autoch-

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thones. They had lost most of their technical knowledge and reverted to the same medieval level.

With the chronic suspiciousness of his people, Gujgengi feared the trade pioneers might be in league with certain treasonable Ershoka. Not long before, a troop of them had captured the city of Rangakora on behalf of the Empire. But then they had kept it for themselves. Under their leader, Bobert Thorn, they were now standing off the Katandarans. Their kinfolk who had remained home were looked at askance and the phratry chief, Harry Smit, no longer had Jadhadi's confidence.

Stepha insisted she had come here only to learn if there was truth to the rumors of a spaceship from Earth. Her people needed the facts, but had no disloyal intentions.

Falkayn decided to have it out with the Emperor. He and Adzel took a flitter to Katandara, leaving Chee Lan behind in the ship to continue her studies with Gujgengi. They dropped Stepha off at the Ershoka barracks and landed in the palace grounds. Jadhadi had little choice but to open discussions. However, he kept stalling matters so that no real progress was made.

Hugh Padrick, a young Ershokh officer, got acquainted with the visitors and offered to show them the town. He took Adzel out first. On his return, the Wodenite was confronted by Ikranankan soldiers who tried to arrest him. Their captain said that Falkayn had disappeared, together with a number of Ershoka. It looked as if all the humans might really be in league with Bobert Thorn. When the Emperor tried to surround their barracks, the strained relationship snapped, and now they were besieged.

Adzel couldn't raise Falkayn on his radio communicator. He called Chee Lan, and heard a scuffle indicating that she had just been made a prisoner. At that, he broke away. His radio was smashed in the fight, but he got clear and started for Haijakata.

There Chee had, meanwhile, pursued her researches. The mission looked hopeless. Not only did it seem impossible to keep secret the existence of Ikrananka, when several thousand humans were entitled to be repatriated, but Katandaran civilization was downright paranoiac. Its religion had no gods, only malignant demons. Its phratries were so ingrown and mutually hostile that no stable political structure had ever developed. It was wary of all innovation, which might be some kind of magical trap. Though the natives were interested in acquiring Terrestrial goods, this desire fought against their ancient conservatism. And in any event, so turbulent a society would not be profitable to deal with.

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When Adzel's call came, Chee was engaged with Gujgengi and a local officer. What they heard on her radio made them capture her before she could defend herself. They could not enter the spaceship, but they surrounded it with guards, whose catapults would kill Adzel if he tried to approach.

Neither of Falkayn's comrades had any idea what had become of him. In fact he had returned to his palace apartment and found three Ershoka there. One was Stepha. They grabbed him and drugged him.

Part 2

VII

Falkayn didn't black out. Rather, consciousness fragmented, as if he were at a final stage of intoxication. His mind went off on a dozen different tracks, none involving will power.

Sagging against the wall as the Ershoka released him, he was dizzily aware of its hardness at his back; of how the floor pressed with a planet's mass on his bootsoles; of air chill and dry in his nostrils, soughing in his lungs, and the bitter drug-odor; of his heart slamming; of red light a-sheen on the naked floor, and the dusky sky in a window across its expanse, which seemed to be tilting; of the big blond man who had mugged him, and the equally big redhead who supported him; of the redhead's nose, whose shape had some cosmic and probably sinister significance. He thought once that the Ikranankan stuff he'd breathed must have pharmaceutical possibilities; then he thought of his father's castle on Hermes and that he really must write home more often; but in half a second he was remembering a party at Ito Yamatsu's place in Tokyo Integrate; and this, by an obvious association, recalled several young women to him; which in turn led him to wonder—

"Give me a hand, Owen." Stepha Carls muttered. "His batman'll be back soon. Or anybody might chance by."

She began to strip off Falkayn's clothes. The process could have been embarrassing if he weren't too muzzy to care.

"All right." Stepha jerked her thumb at a bundle on the floor. The yellow-haired man unrolled it, revealing Ershoka garb. The cloth was coarse, the pants reinforced with leather: a cavalry field outfit. She started to dress Falkayn. Her job wasn't easy, the way he lolled in the redhead's arms.

The stupor was leaving, though. Almost, he tried to shout. But drilled-in caution, rather than wit, stopped him. Not a chance, yet. However, strength flowed back, the room no longer whirled, and presently they'd buckle on his dagger belt . . .

Stepha did so. He could have

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whipped out the knife and driven it into her back where she squatted before him. But that would be a dreadful waste. He lurched, sliding aside from the redhead. His hand brushed across the dagger haft, his fingers clamped, he drew and stabbed at the man's chest.

At! There was no blade, only a squared-off stub barely long enough to keep the thing in its sheath. The Ershokh took a bruise, no doubt; he recoiled with a whispered curse. Falkayn, still wobbly, staggered for the doorway. He opened his mouth to yell. The blond grabbed his arms and Stepha her wet rag. Tiger swift; she bounded forward and crammed it down his gape.

As he spun into pieces again, he saw her grin and heard her murmur genially, "Nice try. You're a man of parts in more ways than one. We reconed you might be."

She bent to take his guns. Light coursed along her braids. "Hoy!" said the blond. "Leave those."

"But they're his weapons," Stepha said. "I told you what they can do."

"We don't know what else they're good for, what black magic might be in 'em. Leave them be, I said."

The redhead, rubbing his sore ribs, agreed. Stepha looked mutinous. But there was scarcely time to argue. She sighed and rose. "Put the stuff in his cabinet, then, so they'll think he just stepped out, and let's go."

With a man on either side supporting him by his elbows, Falkayn reeled into the hall. He was too loaded to remember what the fuss was about and obeyed their urging mechanically. In this residential part of the palace, few were abroad. On the downramp they passed his servant, returning with a jug of ferocious booze. The Ikranankan didn't recognize him in his new clothes. Nor did anyone in the more crowded passages below. One official asked a question. "He got drunk and wandered off," Stepha said. "We're taking him to barracks."

"Disgraceful!" said the bureaucrat. Confronted by three armed and touchy Ershoka who were sober, he did not comment more.

After some time Falkayn was so far recovered that he knew they'd come to a sally port in the north wall. Cityward, the view was blocked by a row of houses. Some twenty Ershoka, most of them men, waited impatiently in battle dress. Four Tiruts, the sentries, lay bound, gagged, and indignant. The humans slipped out.

The canyon of the Yanjeh lay west of town, marked by leafy sides and the loud clear rush of water. There, too, the upland highway entered. Here was sheer desert, that rose sharply in crags, cliffs, and talus slopes, ruddy with iron oxide and sun, to the heights. In such a wilderness, the Ershoka vanished quickly.

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"Move, you!" The blond jerked Falkayn's arm. "You're undoped by now."

"Uh-h-h, somewhat," he admitted. Normality progressed with every stone-rattling stride. Not that that did him much good, hemmed in by these thugs.

After a while they found a gulch. A good fifty zandaras milled about in the care of two Ikrananka riders. Several were pack animals, most were mounts and remounts. The band swung into their saddles. Falkayn got on more gingerly. The natives headed back toward town.

Stepha took the lead. They climbed until they were above the cliffs, on dunes where nothing lived but a few bushes. At their backs, and northward, Yanjeh Belt shone green. The city gloomed below them, and beyond, The Chakora reached flat and murky to the horizon. But they pointed themselves east and broke into full gallop.

No, hardly the word! Falkayn's zandara took off with an acceleration that nearly tore him from his seat. He knew a sick moment of free fall, then the saddle and his lower jaw rose and hit him. He flopped to the right. The man alongside managed to reach over and keep him from going off. By then the zandara was once more aloft. Falkayn bounced backward. He saved himself by grabbing the animal's neck. "You want to strangle your beast?" someone yelled.

"As . . . a . . . matter . . . of . . . fact . . . yes," Falkyan gusted between bounces.

Around him gleamed helmets, byrnies, spearheads, gaudy shields and flying cloaks. Metal clattered, leather creaked, footfalls drummed. Sweat and zandara musk filled the air. So did fine sand, whirled up in a cloud. Falkayn had a glimpse of Stepha, across the wild pack. The she-troll was laughing!

He gritted his teeth. If he was to survive this ride, he'd have to learn the technique.

Bit by bit, he puzzled it out. You rose slightly in the stirrups as the zandara came down, to take the shock with flexed knees. You swayed your body in rhythm with the pace. And, having thought yourself athletic, you discovered that this involved muscles you never knew you had, and that said muscles objected. His physical misery soon overwhelmed any speculation as to what this escapade meant.

A few times they stopped to rest and change steeds, and after some eternities to camp. That amounted to gulping down iron rations from the saddlebags, with a miserly drink of water from your canteens. Then you posted guards, got into your bedroll, and slept.

Falkayn didn't know how long he had been horizontal when Stepha roused him. "Go 'way," he mumbled, and burrowed back into the

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lovely dark. She grabbed a handful of hair and yanked. Eventually she dragged him to breakfast.

Their pace was easier now, though, and some of the aches worked themselves out of Falkayn. He began to notice things. The desert was getting hillier all the time, and a little more fertile, too. The sun behind him was lower, shadows stretched enormous in front, toward the Sundhadarta mountains whose slate-blue bulk was slowly lifting over the world's edge. The Ershoka had relaxed, they joked and laughed and sang some rather bloodthirsty songs.

Near the end of the "day," a lone rider with a few spare animals overtook them. Falkayn started. Hugh Padrick, by Satan! The Ershokh waved affably at him and rode to the head of the parade to confer with Stepha.

Those two were still talking when the second camp was made, on a hilltop among scattered vividly yellow bushes. The Ershoka didn't go to sleep at once, but built small fires and lounged about in companionable groups. Falkayn let another man unsaddle his zandaras, hobble them and turn them out to graze. Himself, he sat down with the intention of sulking, but got up fast.

A shadow in the long light fell across him. Stepha stood there. He must admit she was a handsome sight, full-bodied, queenly featured. More used to the chill than he, she'd stripped to blouse and kilt, which further lightened his mood.

"Come join us," she invited.

"Do I have a choice?" he said hoarsely.

The gray eyes were grave on his. She touched his hand in an almost timid fashion. "I'm sorry, David. This is no way to treat you. Not after all you did for me. No, you deserve better'n this in your own right. But won't you let me explain?"

He followed her less grudgingly than he made out, to a fire where Padrick sat toasting some meat on a stick. "Hullo," the Ershokh said. A grin flashed white in his grimy beard. "Hope you liked the ride so far."

"What's become of Adzel?" Falkayn demanded.

"Dunno. Last I saw, he was headed for the palace, drunk's a brewmaster. Reckoned I'd better get out of town before the fun started, so I went back to Lake Urshi where I'd hid my animals and took off after you. Saw your dust a long ways off." Padrick lifted a leather bottle. "Took some booze."

"Do you suppose I'll drink with you, after—"

"David," Stepha pleaded. "Hear us out. I don't think your big friend can have gotten into deep trouble. They'd not dare hurt him when the little one still has your flier. Or Jadhadi may decide right away you were snatched, 'stead of leaving of your will."

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"I doubt that," Falkayn said. "A galactic might, but those Ikranankans see a conspiracy under every bed."

"We've made trouble for our own mates too, in the Iron House," Stepha reminded him. "Could come to blows between them and the beakfaces, what with nerves being strung so tight on both sides."

"That's a hell of a way to run a phratry," Falkayn said.

"No! We're working for their good. Only listen to us."

Stepha gestured at a saddle blanket spread over the ground. Falkayn yielded and lowered himself, reclining Roman fashion. The girl sat down beside him. Across the fire, Padrick chuckled tolerantly. "Dinner coming soon," he promised. "How about that drink?"

"Oh, the devil, all right!" Falkayn glugged. The thermonuclear liquid scorched some of the aches from him and blunted his worry about Adzel.

"You're Bobert Thorn's people, aren't you?" he asked.

"We are now," Stepha said. "Me alone, at first. You see, Thorn sends out spies, Ikranankans, that is. If they must be conquered, the Rangakorans would mostly rather have Ershoka than Deodakhs; we seem to get along better. So some of their units are fighting on our side, and then there are the merchants and— Anyhow, it's not hard for one to sneak out and mingle with the besiegers, claiming to be a highland trader come to see if he can peddle anything. Or whatever."

Rotten security, Falkayn reflected. How come, in a race that suspected everyone not an in-law of being an outlaw? Well, yes, such clannishness would make for poor liaison between different kin-regiments. Which invited, if not espionage, at least the gathering of intelligence.

"Jadhadi's people also got wind of you," Stepha said. "I reckon he alerted his top officers, and somebody blabbed." Falkayn could imagine the process: a Tirut or Yandaji ordered by a Deodakh to have secrets from his own relatives, getting mad and spilling the beans on principle. "Just dim, scary rumors seeped down to the ranks, you understand. But our spies heard them, too. We didn't know what they meant, and had to find out. Twilight was still over the area, so I got clear without being seen, rustled me a couple of zandaras, and headed off. A patrol near Haijakata did notice me, though. My spare mount took a quarrel. I very near did myself." She laughed and rumpled Falkayn's hair. "Thanks, David."

"And, of course, when you sounded us out and learned we were on Jadhadi's side, you pretended to be likewise," he nodded, mainly to rub his head against her palm. "But why'd you take the risk of coming back to Katandara with us?"

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"Had to do something, didn't I? You meant to break us. I didn't know what I could swing, but I did know there must be a lot of people who wished they'd been sent to Rangakora, too. And I knew nobody in the Iron House would give me away to the Ikranankans." Stepha grinned mischievously. "Oh, but old Harry Smit was mad! He wanted to court-martial me on the spot. But too many others wouldn't have it. He settled for confining me to barracks while he tried to figure out some answer to the whole mess. That was a mistake. I could sit there and talk, whenever he wasn't around. I could guess who to talk most with, too—old friends and lovers that I knew well."

"Huh?" said Falkayn. Padrick looked smug.

"So we plotted," Stepha said. "We waited for a chance to act. Hugh hired a couple of his Old City buddies to buy animals and supplies and keep them stashed. We'd money enough between us, our gang. Then he went and got to know you. Plain, we'd never snatch you from Adzel. Would've been simpler if you'd gone out with Hugh. But when you let Adzel go first, we reckoned we'd better not lose more time. One by one, our prople found excuses to stroll into town. Owen and Ross smuggled me out the back. We headed for your apartment. Nasty shock when you weren't there! But you must've gone to an Imperial audience, so we waited and hoped."

Falkayn took another comforting swig, rolled over on one elbow, and looked hard at the girl. "What's the point of this fantastic stunt?" he demanded.

"To stop you from helping Jadhadi," Padrick said. "Maybe even get you to help us. We're your fellow humans, after all."

"So are the Ershoka back in Katandara."

"But we're doing this for them also," Stepha insisted. "Why should our phratry be hirelings, and have to live under law and custom never meant for them, when they could be masters of their own country?"

"A better country than back yonder, anyhow," Padrick said.

"Bobert Thorn's thought," Stepha agreed. "He hoped the Ershoka would break from Jadhadi and come join him as soon as they learned what he'd done. Be tough, we know, cutting a way through the Imperial army. There'd be lives lost. But it could be done"—her voice rang forth— "and well worth the price!"

"You may have provoked matters so far by snatching me that the Ershoka won't have any choice," Falkayn admitted bitterly. "And for what? Didn't I tell you that you can all be returned to Earth?"

Stepha's eyes widened. Her hand went to her mouth. "Oh! I forgot!"

"Too late now," Padrick laughed. "Besides, take time to fetch your fliers, right, David? Meanwhile, what's to happen at Rangakora?

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And . . . I'm not sure I'd want to leave. Earth ways may be too different, worse than Katandara."

"Very well," Falkayn said. "You've succeeded this far. You've made trouble in the capital. You've prevented our ship taking action till my mates find what's become of me. You may have driven a wedge between us and Jadhadi. But don't think we'll do your dirty work for you."

"I wish you would, though," Stepha murmured, and stroked his cheek.

"Now cut that out, girl! I come to curry Caesarism, not to raze it."

"No matter," said Padrick. "Long's your, uh, ship keeps hands off"—Falkayn had a brief giddy vision of *Muddlin' Through* with hands—"we'll manage. And it'll sure do that while we've got you."

"Unless she rescues me, knocking down your walls in the process."

"They try," said Padrick, "and they'll find you in two pieces. We'll let 'em know that, if they do show up." He didn't even have the decency to sound grim.

"It'd be such a pity," Stepha cooed. "We've hardly begun our friendship, David."

"Meat's cooked," said Padrick.

Falkayn resigned himself. He didn't mean to stay passive longer than he must. However, food, drink, and a pretty woman constituted a situation which he could accept with an equanimity that would make Adzel proud of him. (*Adzel, you scaly old mutt, are you safe? Yes, you've got to be. All you need do is radio Chee for help.*) The conversation at dinner was amicable and animated. Padrick was a fine fellow after several drinks, and Stepha was a supernova. The only fault he could find, at length, was that they insisted on switching off the party to rest for the next stage. Dismal attitude.

His watch had been left behind with everything else, but as near as he could tell, the Ershoka had a well-developed time sense. The ancient cycles of Earth still governed them. An hour to get started, sixteen hours—with short breaks—to travel, an hour to make camp and relax, six hours' sleep, divided roughly between two changes of guard. Not that there was much to fear, in this wasteland.

But the country grew yet greener as the sun sank, until the Sundhadarta foothills were carpeted with mosslike growth, brooks rilled and forests of plumed stalks swayed in the wind. Once clouds massed in the north, colored hot gold. The mountains rose sheer to east, aglow in the level red light. Falkayn saw snowpeaks and glaciers. Above them the sky was a royal purple deepening toward black, where fifty stars and a planet glimmered. They were at the edge of the Twilight Zone.

Not only did the atmosphere diffuse enough light to make a belt of dusk; Ikrananka had a rather eccen-

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tric orbit, and so librated. The gloaming swept back and forth across these lands, once in each seventy-two-day year. At present it had withdrawn, and the sun stood a little above the western piedmont. The slopes reflected so much heat, and so much infrared got through at this altitude, that the region was actually warmer than Katandara. The precipitation of the cold season was melting, and rivers foamed down the cliffs. Falkayn understood now why Rangakora was coveted.

He estimated that the party had traveled about five Terrestrial days, covering some four hundred kilometers, when they turned south toward the eastern end of The Chakora. A shoulder thrust huge before them and they must climb, up toward the snow cone of Mount Gundra. Falkayn had gotten used to the saddle and let his zandara do the struggling while he admired the tremendous view and reminisced about his last session by the campfire. Padrick had gone off with some other girl, leaving him and Stepha alone. Well, not exactly alone; no privacy, with people scattered around; but still, he reflected, his captivity might turn out to have compensations.

They rounded a precipice and Rangakora stood above them.

The city was built athwart a pass over the range, on a small plateau. A road of sorts wound heavenward from it, and on this side precipitously down toward the sea bottom. That glimmered misty, marshy, intensely green and gold. A river coursed near the wall. For the most part it was hidden by forest, but just above Rangakora it leaped over a sheer cliff and thundered in a waterfall crowned by rainbows. Falkayn caught his breath.

The Ershoka halted and drew together. Shields went onto arms, sabers into hands, crossbows were cocked and lances couched. Falkayn realized with a gulp that now was no time to contemplate scenery.

The plateau's verdure was scarred by feet. Campfires smoked around the city's rough walls, tents crowded and banners flew. Tiny at this remove, Jadhadi's people sat in clumps before the prize from which they had been expelled.

"We'll make a rush," Padrick said. The wind and the cataract boomed around his words. "Thorn's folk'll see us and sally forth to fetch us in."

Stepha brought her animal next to Falkayn's. "I'd not want you to get ideas about bolting and surrendering to the others," she smiled sweetly.

"Oh, hell," said Falkayn, who already had them.

She looped a cord from her saddlebow to his zandara's bridle. Another girl tied his right ankle to the stirrup. He had often been told about the moral and psychological value of absolute commitment, but this seemed a bit extreme.

"Battle formation!" Padrick

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called. His sword flew clear. "Charge!"

The beasts bounded forward. Drums beat staccato alarm from the Imperial outposts. A cavalry squadron marshalled themselves and started full tilt to intercept. Their lances flashed intolerably bright.

VIII

Being as prone to disorderly conduct as most races, the Ikranankans needed jails. Haijakata's was a one-room cabin near the market square. An interior grid of stout stalks, closely lashed together, protected the woven outside walls against any tenants. If a prisoner wanted light, he could draw back the door curtain; but the wooden-barred gate beyond would remain locked. Furniture amounted to a straw tick and some clay utensils. Chee had broken one of these and tried to cut her way out with a shard. It crumbled, showing that while her captors might be crazy, they were far from stupid.

A click and rattle snapped her out of a rather enjoyable reverie. The door creaked open, the curtain was pulled aside, relieving the purplish dusk, and Gujgengi's spectacles glittered. "I was just thinking about you," Chee said.

"Indeed? May I ask what?"

"Oh, something humorous, but lingering, with either boiling oil or melted lead. What do you want?"

"I . . . uk-k-k . . . may I come in?" The curtain drew wider. Behind the gaunt, robed form, Chee saw a couple of armed and alert guards, and beyond them a few civilians haggling at the market booths. The quarantine had reduced trade to a minimum. "I wish to ascertain if you are satisfactorily provided for."

"Well, the roof keeps off the rain."

"But I have told you that rainfall is unknown west of Sundhadarta."

"Exactly." Chee's glance fell wistful on the saber at Gujgengi's side. Could she lure him in alone and snatch that— No, he need only fend off an attack and holler. "And why can't I have my cigarettes? That is, those fire-tubes you have seen me put in my mouth."

"They are inside your house, most noble, and while the house does not appear to resent being guarded, it refuses to open for us. I asked."

"Take me there, and I will give it orders."

Gujgengi shook his head. "No, I regret. That involves too many unknown powers you might unleash. When the present, ak-krr, deplorable misunderstanding has been cleared up, yes, indeed, most noble. I have dispatched couriers post-haste to Katandara, and we should receive word before long." Taking an invitation for granted, he stepped through. The soldiers closed the awkward padlock.

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"Meanwhile poor Adzel arrives and gets himself killed by your hotheads," Chee said. "Pull that curtain, you dolt! I don't want those yokels gaping in at me."

Gujgengi obeyed. "Now I can scarcely see," he complained.

"Is that my fault? Sit down. Yes, there's the bedding. Do you want some booze? They gave me a crockful."

"Ek-k-k, well, I ought not."

"Come on," Chee urged. "As long as we drink together, we are at least not deadly enemies." She poured into a clay bowl.

Gujgengi tossed off the dose and accepted a refill. "I do not perceive you drinking," he said in a heavy-footed attempt at humor. "Do you plan to get me intoxicated, perhaps?"

Well, Chee thought with a sigh, *it was worth trying.*

Briefly, she grew rigid. The jolt passed, her mind hummed into overdrive, she relaxed her body and said, "There isn't much else to do, is there?" She took the vessel and drank. Gujgengi couldn't see what a face she made. Pah!

"You malign us, you know," she said. "We have none but the friendliest intentions. However, if my comrade is killed when he arrives, expect revenge."

"Krrr-ek, he will be only if he grows violent. Somewhat against Commandant Lalnakh's wish, I have posted criers who will shout warnings that he is to stay away. I trust he will be sensible."

"Then what do you plan to do about him? He has to eat." Gujgengi winced. "Here, have another drink," Chee said.

"We, ak-krrr, we can try for some accommodation. Everything depends on what message I get from the capital."

"But if Adzel has headed this way, he will be here well before that. Come on, drink and I'll recharge the bowl."

"No, no, really, this is quite enough for an oldster like me."

"I don't like to drink alone," Chee urged.

"You have not taken much," Gujgengi pointed out.

"I'm smaller than you." Chee drained the vessel herself and glugged out some more from the crock. "Though you would be astonished at my capacity," she added.

Gujgengi leaned forward. "Very well. As an earnest of my own wish for friendship, I will join you." Chee could practically read his thought: *Get her drunk and she may reveal something.* She encouraged him with a slight hiccup.

He kept his own intake low, while she poured the stuff down at an ever mounting rate. Nonetheless, in the course of the next hour or so, his speech grew a little slurred.

He remained lucid, however, in contrast to Chee. He was not unsubtle about trying to trap her into

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an admission that Falkayn must have engineered the trouble in Katandara. When her denials grew belligerent, he abandoned that line. "Let us discuss something else," he said. "Your capabilities, for example."

"I'm'sh capable'sh you," Chee said.

"Yes, yes, of course."

"More sho."

"Well, you have certainly—"

"Prettier, too."

"Uk-k-k, tastes vary, you know, tastes vary. But I must concede you an intrinsic—"

"So I'm not beautiful, huh?" Chee's whiskers dithered.

"On the contrary, most noble. Please, I beg you—"

"Sing real good, too. Lisshen." Chee rose to her feet, bowl in hand, and staggered about waving her tail and caterwauling. Gujgengi folded his ears.

"Ching, chang, guli, guli yassa,
Ching, chang, guli, guli bum."

"Most melodious! Most melodious! I fear I must be on my way." Gujgengi stirred, where he sat on the mattress.

"Don' go, ol' frien'," Chee pleaded. "Don' lea' me 'lone."

"I will be back. I—"

"Oops!" Chee reeled against him. The bowl swept across his glasses. They fell. Chee grabbed after them. She came down on top, with the bowl. There was a splintering.

"Help!" Gujgengi cried. "My spectacles!"

"Sho shorry, sho shorry." Chee fumbled around after the pieces.

The guards got in as fast as they could. Chee retreated. Gujgengi blinked in the sudden brightness. "What's wrong, most noble?" asked a soldier. His sword was out.

"Li'l accshiden'," Chee babbled. "Ver' shorry. I fix you up."

"Stand back!" The saber poked in her direction. The other guard stooped and collected the pieces.

"It was doubtless unintentional," Gujgengi said, making signs against demons. "I think you had best get some sleep now."

"Fix you up. Got doctors, we do, fix your eyes sho you never need glasshes." Chee was surprised at her own sincerity. The Imperial envoy wasn't such a bad sort, and doubtless he'd have a devil of a time getting replacements. Katandaran optometry must be a crude cut-and-try business.

"I have spares," Gujgengi said. "Conduct me to my residence." He saluted Chee and shuffled out. She rolled over on her tick and closed her eyes.

"Too mush light," she complained. "Draw 'at curtain."

They obeyed, before locking the door again. She waited a few minutes then she rose, but continued to emit realistic snores.

The liquor made her stomach uneasy. But it hadn't affected her mind. Ethanol is a normal product of Cynthian metabolism. And . . .

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unseen in murk, by Gujgengi's weak eyes, she had palmed a couple of the largest fragments and slipped them under the mattress.

She ripped the ticking with her teeth, for rags to protect her hands, and got busy at the far end of the hut.

The glass wasn't very hard. As edges wore down, it sawed with ever less efficiency on the lashings of the framework. She could use pressure flaking to resharpen—a League academy gives a broad practical education—but only a few times before the chunks got too small to handle. "Hell and damnation!" she shouted when one of them broke completely.

"What's that?" called a voice from outside.

"Z-z-z-z," snored Chee.

A human would have sweated through that slow hour, but she was philosophical about the possibility of failing. Nonetheless, she barely finished before her tools wore to uselessness.

Now, arch your spine, pour through your arms and legs the strength they won leaping from branch to branch in the forests of home . . . ugh! . . . : the canes bent aside, she squirmed through, they snapped back into position and she was caught against the outer wall. Its fabric was rough against her nose. Panting, shivering in the chill gloom, she attacked with teeth and nails. One by one, the fibers gave way.

Quick, though, before somebody noticed!

A rent appeared, ruddy sunlight and a windowless carpet-wall across a deserted lane. Chee wriggled out and ran.

The city gates might or might not be watched too closely. But in either case, crossing that much distance, she'd draw half the town after her. Somebody could intercept her; or a crossbow could snap. She streaked around the jail and onto the plaza.

The natives screeched. A foodwife ducked behind her wares. A smith emerged from his shop, hammer in hand. Her guards took off after her. Ahead was a kiosk, at the center of the square. Chee sprang through its entrance.

Rough-hewn steps wound downward into the hill. A dank draft blew in her face. The entrance disappeared from sight and she was in a tunnel, dug from earth and stone, lit at rare intervals by shelved lamps. She stopped to pinch the wicks of the first two. Though she must then slow, groping until she reached the next illuminated spot, the Ikranankans were more delayed. Their cries drifted to her, harsh and distorted by echoes. Not daring to meet the unknown in the dark, they'd have to go back for torches.

By that time she was out at the bottom of the hill. A short stone passage led to a room with a well

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in the middle. A female let go the windlass handle and jumped onto the coping with a scream. Chee ignored her. The gate here was open and unguarded, when the town faced no immediate threat. She'd seen that before, at the time Gujgengi gave her party the grand tour. She bounded from the tower, forth into brush and sand.

A glance behind showed turmoil at Haijakata's portals. She also glimpsed *Muddlin' Through,* nose thrusting bright into the sky. For a moment she debated whether to try regaining the ship. Once aboard, she'd be invincible. Or a shouted command for the vessel to lift and come get her would suffice.

No. Spears and shields ringed in the hull. Catapults crouched skeletal before them. She'd never get within "earshot" without being seen, nor finish a wigwag sentence before a quarrel pierced her. And Muddlehead hadn't been programmed to do anything without direct orders, no matter what the detectors observed.

Oh, well. Adzel could set that right. Chee started off. Before long she was loping parallel to the Haijakata road, hidden by the farm crops that lined it, all pursuit shaken.

The air was like mummy dust—thin mummy dust—and she grew thirstier by the minute. She managed to suppress most symptoms by concentrating on how best to refute a paper she'd seen in the *Journal of Xenobiology* before they left Earth. The author obviously had hash for brains and fried eggs for eyes.

Even so, eventually she had to get a drink and a rest. She slanted across the fields toward a canebrake that must mark a spring. There she glided cautiously, a shadow among shadows, until she peered out at the farmstead it enclosed.

Adzel was there. He stood with a pig-sized animal, from a pen of similar beasts, hooting in his arms, and said plaintively to the barred and shuttered central keep: "But my good fellow, you must give me your name."

"For you to work magic on?" said a hoarse male voice from within.

"No, I promise you. I only wish to give you a receipt. Or, at least, know whom to repay when I am able. I require food, but I do not intend to steal."

A dart whined from an arrow slot. He sighed. "Well, if you feel that way—"

Chee came forth. "Where's some water?" she husked.

Adzel started. "You! Dear friend, what in the universe has happened to you?"

"Don't 'dear friend' me, you klong. Can't you see I'm about to dry up and blow away?"

Adzel tried to bristle. Having no hair, he failed. "You might keep a civil tongue in your head. You would be astonished at how much

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less detested that can make you. Here I have been traveling day and night—"

"What, clear around the planet?" Chee gibed. Adzel surrendered and showed her the spring. The water was scant and muddy, but she drank with some understanding of what Falkayn meant by vintage champagne. Afterward she sat and groomed herself. "Let's catch up on our news," she proposed.

Adzel butchered the animal while she talked. He had no tools for the job, but didn't need them either. In the end, he looked forlorn and said: "Now what shall we do?"

"Call the ship, of course."

"How?"

Chee noticed for the first time that his transceiver was also broken. They stared at each other.

Gujgengi adjusted his spare glasses. They didn't fit as well as the old ones had. The view was fuzzy to his eyes. *This might be preferable, though,* he thought. *The thing is so* huge. *And so full of sorcery. Yes, I do believe that under present circumstances I am quite satisfied not to see it too clearly.*

He gulped, mustered his whole courage, and tottered a step closer. At his back, the soldiers watched him with frightened expressions. That nerved him a trifle. *Must show them we Deodakhs are uniformly fearless and so forth.* Though he would never have come except for Lalnakh. Really, the commandant had behaved like a desert savage. One knew the Tiruts weren't quite one's equals—who was?—but one had at least taken them for a civilized phratry. Yet Lalnakh had stormed and raved so about the prisoner escaping that . . . well, from a practical standpoint too, it would not help Gujgengi's reputation. But chiefly for the honor of the bloodline, one must answer the Tirut's unbridled tirade with stiff dignity and an offer to go consult the flying house. Would the commandant care to be along? No? Excellent. One did not say so immediately, for fear of provoking him into changing his mind, but when one returned, one might perhaps drop a hint or two that most noble Lalnakh had not *dared* come. Yes, one must maintain a proper superiority, even at the risk of one's life.

Gujgengi swallowed hard. "Most noble," he called. His vioce sounded strange in his ears.

"Are you addressing me?" asked the flat tones from overhead.

"Ak-krrr, yes." Gujgengi had already had demonstrated to him, before the present wretched contretemps, that the flying house—no, the word was *shi'*, with some unpronounceable consonant at the end, was it not?—could speak and think. Unless, to be sure, the strangers had deceived him, and there was really someone else inside. If this were so then the someone had a peculiar personality, with little or no will of its own.

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"Well?" said Gujgengi when the silence had stretched too far.

"I wait for you to proceed," said the shi'.

"I wish, most noble, to ask your intentions."

"I have not yet been told what to intend."

"Until then you do nothing?"

"I store away whatever data I observe, in case these are required at a later time."

Gujgengi let out a hard-held breath. He'd hoped for something like this. Greatly daring, he asked: "Suppose you observed one of your crew in difficulties. What would you do?"

"What I was ordered to do, within the limits of capability."

"Nothing else? I mean, krrr-ek, would you take no action on your own initiative?"

"None, without verbal or code orders. Otherwise there are too many possibilities for error."

Still more relieved, Gujgengi felt a sudden eagerness to explore. One had one's intellectual curiosity. And, of course, what was learned might conceivably find practical application. If the newly-come Ershokh and his two eldritch companions were killed, well, the shi' would still be here. Gujgengi turned to the nearest officer. "Withdraw all personnel a distance," he said. "I have secrets to discuss."

The Tirut gave him a suspicious glance but obeyed. Gujgengi turned back to the shi'. "You are not totally passive," he pointed out. "You answer me in some detail."

"I am so constructed. A faculty of logical judgment is needed."

"Ak-krrr, do you not get, shall we say, bored sitting here?"

"I am not constructed to feel tedium. The rational faculty of me remains automatically active, analyzing data. When no fresh data are on hand, I rehearse the logical implications of the rules of poker."

"What?"

"Poker is a game played aboard my hull."

"I see. Uk-k-k, your responsiveness to me is most pleasing."

"I have been instructed to be nonhostile to your people. 'Instructed' is the closest word I can find in my Katandaran vocabulary. I have not been instructed not to reply to questions and statements. The corollary is that I should reply."

Excitement coursed high in Gujgengi. "Do you mean . . . do I understand you rightly, most noble . . . you will answer any question I ask?"

"No. Since I am instructed to serve the interests of my crew, and since the armed force around me implies that this may have come into conflict with your interests, I will release no information which might enhance your strength."

The calmness was chilling. And Gujgengi felt disappointed that the shi' was not going to tell him how

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to make blasters. Still, a shrewd interrogator might learn something. "Would you advise me about harmless matters, then?"

The wind blew shrill, casting whirls of grit and tossing the bushes, while the hidden one considered. Finally: "This is a problem at the very limits of my faculty of judgment. I can see no reason not to do so. At the same time, this expedition is for the purpose of gaining wealth. The best conclusion I can draw is that I should charge you for advice."

"But, but how?"

"You may bring furs, drugs, and other valuables, and lay them in that open doorway you presumably see. What do you wish me to compute?"

Taken aback, Gujgengi stuttered. He had a potential fortune to make, he knew, if only he could think . . . Wait. He remembered a remark Chee Lan had made in Lalnakh's house before her arrest. "We play a game called *akritel,*" he said slowly. "Can you tell me how to win at it?"

"Explain the rules."

Gujgengi did so. "Yes," the shi' said, "this is simple. There is no way to win every time without cheating. But by knowing the odds on various configurations that may be achieved, you can bet according to those odds and, therefore, be ahead in the long run, assuming your opponents do not. Evidently they do not, since you ask, and since Drunkard's Walk computations involve comparatively sophisticated mathematics. Bring writing materials and I will dictate a table of odds."

Gujgengi restrained himself from too much eagerness. "What do you want for this, most noble?"

"I cannot be entirely certain. Let me weigh what information I have, in order to estimate what the traffic will bear." The shi' pondered a while, then named what it said was a fair amount of trade goods. Gujgengi screamed that this would impoverish him. The shi' pointed out that in that case he need not buy the information. It did not wish to haggle. Doubtless there were others who would not find the fee excessive.

Gujgengi yielded. He'd have to borrow a sum to pay for that much stuff; still, with the market depressed by the quarantine, the cost wouldn't be unmanageable. Once he left this miserable hamlet and returned to Katandara, where they gambled for real stakes—

"Did you learn anything, most noble?" asked the officer as Gujgengi started uphill again.

"Yes," he said. "Most potent information. I will have to pay a substantial bribe, but this I will do out of my own pocket, in the interests of the Emperor. Ak-krrr . . . see to it that no one else discourses with the shi'. The magic involved could so easily get out of hand."

"Indeed, most noble!" shuddered the officer.

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IX

The heroes of adventure fiction can go through any harrowing experience and—without psychochemicals, usually without sleep, always without attending to bodily needs—are at once ready to be harrowed all over again. Real people are built otherwise. Even after a possible twelve hours in the sack, Falkayn felt tired and sore. He hadn't been hurt during that wild ride through the Katandaran lines, but bolts zipped nastily close, and Stepha sabered an enemy rider seconds before he reached the Hermetian. Then Bobert Thorn's people sallied, beat off the opposition, and brought the newcomers into Rangakora. Falkayn wasn't used to coming that near death. His nerves were still tied in knots.

It didn't help that Stepha was utterly cheerful as she showed him around the palace. But he must admit that the building fascinated him. Not only was it more light and airy than anything in Katandara, not only did it often startle him with beauty; it held the accumulated wealth of millennia less violent than further west. There were even interior doors such as he knew at home, of bronze cast in bas reliefs; reasonably clear glass windows; steam heating.

They left the electroplating shop, a royal monopoly operated in the palace, and strolled to a balcony. Falkayn was surprised at how far the grave philosophers had progressed: lead-acid batteries, copper wire, early experimentation with a sort of Leyden jar. He could understand why this was a more congenial society for humans than Katandara.

"Jeroo, there's Thorn himself, and the king," Stepha exclaimed. She led Falkayn to the rail where they stood. His two guards tramped behind. They were friendly young chaps, but they never left him and their weapons were loose in the scabbards.

Thorn put down the brass telescope through which he had been looking and nodded. "That camp gets sloppier every watch," he said. "They're demoralized, right enough."

Falkayn glanced the same way. The palace was a single unit, many-windowed, several stories high. He was near the top. No wall surrounded it, simply a garden, and beyond that the city. Like Katandara, Rangakora was so old as to be almost entirely stone-built. But the houses here were a symphony of soft whites, yellows, and reds. Facing outward rather than inward, with peaked tile roofs and graceful lines, they reminded him somewhat of First Renaissance architecture on Earth. Traffic moved on comparatively wide, paved avenues, distance-dwarfed figures, a faint rumble of wheels and clatter of feet. Smoke drifted into a Tyrian sky where a few clouds wandered. Be-

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hind, the heights soared gray-blue to Mount Gundra, whose snowcap glowed gold with perpetual sunset. The falls tumbled on his right, white and green and misted with rainbows, querning their way down to a Chakora which here was brilliant with fertility.

His gaze stopped short, at the besiegers. Beyond the city ramparts, their tents and campfires dotted the plateau, their animals grazed in herds and metal flashed where the soldiers squatted. Jadhadi must have sent powerful reinforcements when he learned of the rebellion. "I'd still not like to take them on, the way they outnumber your effectives," he said.

Bobert Thorn laughed. He was a stocky, grizzle-bearded man with fierce blue eyes. Old battle scars and well-worn saber stood out against his embroidered scarlet tunic and silky trousers. "No hurry," he said. "We've ample supplies, more than they're able to strip off the country. Let 'em sit for a while. Maybe the rest of the Ershoka will arrive. If not, come next twilight they'll be so hungry and diseased, and half blinded to boot, we can rout 'em. They know that themselves, too. They haven't much guts left." He turned to the slim red-pelted young Ikranankan in saffron robe and gilt chaplet. "King Ursala, this here's the man from Beyond-The-World I told you about."

The monarch inclined his avian head. "Greeting," he said, in a dialect not too thick to follow. "I have been most anxious to meet you. Would the circumstances had been friendlier."

"They might be yet," Falkayn hinted.

"Not so, if your comrades carry out their threat to bring us under Katandara," said Ursala. His mild tone softened the import.

Falkayn felt ashamed. "Well, uh, there we were, strangers with no real knowledge. And what's so bad about joining the Empire? Nobody there seemed to be ill treated."

Ursala tossed his ruff and answered haughtily: "Rangakora was ancient when Katandara was a village. The Deodakhs were desert barbarians a few generations ago. Their ways are not ours. We do not set phratry against phratry, nor decree that a son is necessarily born into his father's profession."

"That so?" Falkayn was taken aback.

Stepha nodded. "Phratries here're just family associations," she said. "Guilds cut right across them."

"That's what I keep telling you, most noble," said Thorn self-righteously. "Once under the protection of the Ershoka—"

"Which we did not ask for," Ursala interrupted.

"No, but if I hadn't decided to take over, Jadhadi's viceroy would be here now."

"I suppose you are the best of

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a hard bargain," sighed the king. "The Irshari may have favored us too long; we seem to have lost skill in war. But let us be honest. You will exact a price for your protection, in land,treasure, and power."

"Of course," said Thorn.

To break an uncomfortable silence, Falkayn asked who or what the Irshari might be. "Why, the makers and rulers of the universe," said Ursala. "Are you as superstitious in Beyond-The-World as they are in the Westlands?"

"Huh?" Falkayn clenched his fists. A shiver ran through him. He burst into questions.

The responses upset every preconception. Rangakora had a perfectly standard polytheistic religion, with gods that wanted sacrifices and flattery but were essentially benevolent. The only major figure of evil was he who had slain Zuriat the Bright, and Zuriat was reborn annually while the other gods kept the bad one at bay.

But then the Ikranankans were not paranoid by instinct!

What, then, had made the western cultures think that the cosmos was hostile?

Falkayn's mind leaped: not at a conclusion, he felt sure, but at a solution that had been staring him in the face for weeks. Ikrananka's dayside *had no seasons*. There was no rhythm to life, only an endless struggle to survive in a slowly worsening environment. Any change in nature was a disaster, a sandstorm, a plague, a murrain, a drying well. No wonder the natives were suspicious of everything new, and so by extension of each other. No wonder that they only felt at ease with fully initiated members of their own phratries. No wonder that civilizations were unstable and the barbarians free to come in so often. Those poor devils!

Rangakora, on the edge of the Twilight Zone, knew rain and snow and quickening, in the alternation of day and dusk. It knew, not just a few isolated stars, but constellations; after its people had ventured into the night land, it knew them well.

But then—

No. Rangakora was small and isolated. It simply hadn't the capability of empire. And, with the factions and wild raiders on this planet, van Rijn would deal with nothing less than an empire. Turning coat and helping out this city might be a quixotic gesture, but the Polesotechnic League didn't go in for tilting at windmills. A liberated Rangakora would be gobbled up again as soon as the spaceship left; for there would be no further visits.

Yet its steadying influence could prove invaluable to outworld traders. Wasn't some compromise possible?

Falkayn glanced despairingly heavenward. When in hell was *Muddlin' Through* going to arrive? Surely Chee and Adzel would look

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first for him here. Unless something dreadful had happened to them.

He grew aware that Ursala had spoken to him, and climbed out of his daze. "Beg pardon, most noble?"

"We use no honorifics," the king said. "Only an enemy needs to be placated. I asked you to tell me about your home. It must be a marvelous place, and the Irshari know I could use some distraction."

"Well . . . uh—"

"I'm interested, too," said Thorn. "After all, if we Ershoka are to leave Ikrananka, that throws everything off the wagon: We might as well pull out of Rangakora now." He didn't look too happy about it.

Falkayn gulped: When the humans were evacuated to Earth, he himself would be a public hero, but van Rijn would take him off trade pioneering. No doubt he'd still have a job: a nice, safe position as third officer on some milk run, with a master's berth when he was fifty and compulsory retirement on a measured pension ten years later.

"Uh, the sun is more bright," he said. "You saw how our quarters were lit, Stepha."

"Damn near blinded me," the girl grumbled.

"You'd get used to that. You'd have to be careful at first anyway, going outdoors. The sun could burn your skin."

"The plague you say!" exploded one of Falkayn's guards.

The Hermetian decided he was giving a poor impression. "Only for a while," he stumbled. "Then you're safe. Your skin turns tough and brown."

"What?" Stepha raised a hand to her own clear cheek. Her mouth fell open.

"It must be hot there;" said Ursala shrewdly.

"Not so much," Falkayn said. "Warmer than here, of course, in most places."

"How can you stand it?" Thorn asked. "I'm sweating right now."

"Well, in really hot weather you can go indoors. We can make a building as warm or cool as we please."

"D'you mean to say I'd have to just *sit,* till the weather made up its own confounded mind to change?" Thorn barked.

"I remember," Stepha put in. "The air you had was muggier'n a marsh. Earth like that?"

"Depends on where you are," Falkayn said. "And actually, we control the weather cycle pretty well on Earth."

"Worse and worse," Thorn complained. "If I'm to sweat, I sure don't want to do it at somebody else's whim." He brightened. "Unless you can fight them when you don't like what they're up to?"

"Good Lord, no!" Falkayn said. "Fighting is forbidden on Earth."

Thorn slumped back against the rail and gaped at him. "But what am I going to do then?"

"Uh . . . well, you'll have to go

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to school for a number of years. That's Earth years, about five times as long as Ikranankan. You'll have to learn, oh, mathematics and natural philosophy and history and— Now that I think about it, the total is staggering. Don't worry, though. They'll find you work, once you've finished your studies."

"What sort of work?"

"Hm-m-m, couldn't be too highly paid, I fear. Not even on a colony planet. The colonies aren't primitive, you realize, and you need a long education to handle the machines we use. I suppose you could become a"— Falkayn groped for native words—"a cook or a machine tender's helper or something."

"Me, who ruled a city?" Thorn shook his head and mumbled to himself.

"You must have some fighting to do," Stepha protested.

"Yes, unfortunately," Falkayn said.

"Why 'unfortunately'? You're a strange one," Stepha turned to Thorn. "Cheer up, cap'n. We'll be soldiers. If Great Granther didn't lie, those places are stuffed with plunder."

"Soldiers aren't allowed to plunder," Falkayn said. They looked positively shocked. "And anyway, they also need more skill with machines than I think you can acquire at your present ages."

"Balls . . . of . . . fire," Thorn whispered.

"We've got to hold a phratry council about this," said a guard in an alarmed voice.

Thorn straightened and took command of himself again. "That wouldn't be easy right now," he pointed out. "We'll carry on as we were. When the siege is broken and we get back in touch with our people, we'll see what we want to do. Ursala, you and I were going to organize that liaison corps between our two forces."

"Yes, I suppose we must," said the king reluctantly. He dipped his head to Falkayn. "Farewell. I trust we can talk later at length." Thorn's good-by was absent-minded; he was in a dark brown study. They wandered off.

Stepha leaned her elbows on the rail. She wore quite a brief tunic, and her hair was unbound. A breeze fluttered the bronze locks. Though her expression had gone bleak, Falkayn remembered certain remarks she had let drop earlier. His pulse accelerated. Might as well enjoy his imprisonment.

"I didn't mean to make Earth sound that bad," he said. "You'd like it. A girl so good-looking, with so exotic a background—you'd be a sensation."

She continued to stare at the watchtowers. The scorn in her voice dismayed him. "Sure, a novelty. For how long?"

"Well— My dear, to me you will always be a most delightful novelty."

She didn't respond. "What the

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deuce are you so gloomy about all of a sudden?" Falkayn asked.

Her lips compressed. "What you said. When you rescued me, I reckoned you for a big piece of man. Should've seen right off, nothing to that fracas, when you'd a monster to ride and a . . . a *machine* in your hand! And unfair, maybe, to call you a rotten zandaraman. You never were trained to ride. But truth, you are no good in the saddle. Are you good for anything, without a machine to help?"

"At least one thing," he tried to grin.

She shrugged. "I'm not mad, David. Only dis'pointed. My fault, truth, for not seeing before now 'twas just your being different made you look so fine."

My day, Falkyan groaned to himself.

"Reckon I'll go see if Hugh's off duty," Stepha said. "You can look 'round some more if you want."

Falkayn rubbed his chin as he stared after her. Beginning bristles scratched back. Naturally, this would be the time when his last dose of antibeard enzyme started to wear off. Outside the ship, there probably wasn't a razor on all Ikrananka. He was in for days of itchiness, until the damned face fungus had properly sprouted.

The girl had not spoken without justification, he thought bitterly. He had indeed been more sinned against than sinning, this whole trip. If Chee Lan and Adzel had come to grief, the guilt was his; he was the captain. In another four months, if they hadn't reported back, the travel plan they'd left at base would be unsealed and a rescue expedition dispatched. That might bail him out, assuming he was still alive. At the moment, he wasn't sure he wanted to be.

A shout spun him around. He stared over the rail and the city wall. Thunder seemed to crash through his head.

Adzel!

The Wodenite came around the bend of the lower road at full gallop. Scales gleamed along the rippling length of him; he roared louder than the waterfall. A shriek lifted from the enemy camp. Drums rolled from Rangakora's towers. Men and Ikranankans swarmed beweaponed to the parapets.

"Demons alive!" gasped at Falkayn's back. He glanced, and saw his two guards goggling ashen-faced at the apparition. It flashed through him: a chance to escape. He slipped toward the door.

Stepha returned. She seized his arm and threw her weight against him. "Look aware!" she yelled. The men broke from their paralysis, drew blade and herded him back. He felt sick.

"What's going on?" he choked. "Where's the spaceship?"

Now he could only watch. A Katandaran cavalry troop rallied

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and charged. Adzel didn't stop. He plowed on through. Lances splintered against his armor, riders spilled and zandaras fled in panic. He might have been stopped by catapult fire. But the field artillery had not been briefed on extraplanetary beings, nor on what to do when an actual, visible demon made straight for them. They abandoned their posts.

Terror spread like hydrogen. Within minutes, Jadhadi's army was a howling, struggling mob, headed downhill for home. Adzel chased them a while, to make sure they kept going. When the last infantry soldier had scuttled from view, the Wodenite came back, across a chaos of dropped weapons, plunging zandaras and karikuts, idle wagons, empty tents, smoldering fires. His tail wagged gleefully.

Up to the gates he trotted. Falkayn couldn't hear what he bellowed, but could well imagine. The human's knees felt liquid. He struggled for air. No time seemed to pass before a messenger hastened out to say he was summoned. But the walk through hollow streets—Rangakora's civilian population had gone indoors to wail at the gods—and onto the parapet, took forever.

The wait calmed him somewhat, though. When he stood with Thorn, Ursala, Stepha, and a line of soldiers, looking down on his friend, he could again think. This close, he saw Chee's furry form on the great shoulders. At least they were both alive. Tears stung his eyes.

"David!" bawled Adzel. "I hoped so much you'd be here. Why don't they let me in?"

"I'm a prisoner," Falkayn called back in Latin.

"No, you don't," said Thorn. "Talk Anglic or Katandaran, that I can understand, or keep mouth-shut."

Because the spearheads bristling around looked so infernally sharp, Falkayn obeyed. It added to the general unpleasantness of life that everybody should learn how his ship was immobilized. And now he really was stuck here. His gullet lumped up.

Thorn said eagerly: "Hoy, look, we've got common cause. Let's march on Haijakata together, get that flying thing of yours away from them, and then on the Katandara."

Ursala's tone grew wintry. "In other words, my city is to be ruled from there in spite of everything."

"We've got to help our brethren," Thorn said.

"I intercepted a courier on my way here," Adzel told them. "I am afraid I lost merit by frightening him, but we read his dispatches. The Ershoka who were in town but not in the Iron House assembled and attacked from the rear. Thus combined, all of them crumpled the siege lines and fought their way out of the city. They took over—what

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was the name now . . . a Chakoran village—and sent for outlying families to come and be safer. Jadhadi does not dare attack them with his available troops. He is calling for reinforcements from the various Imperial garrisons."

Thorn tugged his beard. "If I know my people," he said, "they'll march out before that can happen. And where would they march but to us?" His countenance blazed. "By Destruction! We need but sit, and we'll get everything I wanted!"

"Besides," Stepha warned, "we couldn't trust Falkayn. Soon's he got back that flying machine of his, he could do what he felt like." She gave the Hermetian a hostile look. "Reckon you'd bite on us."

"The one solitary thing I wish for is to get away from this planet," he argued. "Very far away."

"But afterwards? Your stinking merchant's interest does lie with Katandara. And could well be others like you, coming later on. No, best we keep you, my buck." She leaned over the battlements, cupped her hands, and shouted: "Go away, you, or we'll throw your friend's head at you!"

Chee stood up between the spinal plates. Her thin voice barely reached them through the cataract's boom: "If you do that, we'll pull your dungheap of a town down around your ears."

"Now, wait, wait," Ursala pleaded. "Let us be reasonable."

Thorn ran an eye along the faces crowding the wall. Sweat glistened and tongues moistened lips; beaks hung open and ruffs drooped. "We can't well sally against him," he said *sotto voce*. "Our people are too scared right now, and besides, most zandaras would bolt. But we can keep him at his distance. When the whole phratry arrives— yes, that'll be too many. We can wait."

"And keep me alive for a bargaining counter," said Falkayn quickly.

"Sure, sure," Stepha fleered.

Thorn issued an order. Engineers began to wind catapult skeins. Adzel heard the creaking and drew back out of range. "Have courage, David!" he called. "We shall not abandon you."

Which was well meant but not so useful, Falkayn reflected in a gray mood. Thorn not only desired to keep Rangakora, he had to, for the sake of his kinfolk. The Ershoka had been sufficiently infected by the chronic suspiciousness of Katandara that they'd never freely let Falkayn back on his ship. Rather, they'd make him a permanent hostage, against the arrival of other spacecraft. And once firmly established here, they'd doubtless try to overthrow the Deodakh hegemony. Might well succeed, too. The most Falkayn could hope for was that a rescue expedition could strike a bargain: in exchange for him, the League would stay off Ikrananka. The treaty would be observed, he knew; it didn't pay to trade with a

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hostile population. And when he learned this market must not merely be shared, but abandoned, van Rijn would bounce Falkayn clear to Luna.

What a fine bouillabaisse he'd gotten himself into!

His guards hustled him off toward the palace apartment which was his jail. Adzel collected what few draft animals had not broken loose from their tethers, for a food supply, and settled down to his one-dragon siege of the city.

X

Chee Lan had no trouble reaching the east wall unseen. The Katandarans hadn't been close enough to trample the shrubs, nor had the Rangakorans gone out to prune and weed. There was plenty of tall growth to hide her approach. Crouched at the foot, she looked up a sheer dark cliff; a cloud scudded through the purple sky above and made it seem toppling on her. Pungent tarry smells of vegetation filled her nose. The wind blew cold. From the opposite side she heard the cataract roar.

Here in the shadow it was hard to make out details. But slowly she picked a route. As usual, the stones were not dressed except where they fitted together, and the rains and frosts of several thousand years had pitted them. She could climb.

Her sinews tautened. She sprang, grabbed finger- and toeholds, reached for the next and the next. Chill and rough, the surface scratched her belly. She was handicapped by her loot from the empty camp, two daggers at her waist and a rope coiled around her. Nonetheless, unemotionally, she climbed.

When her fingers grasped the edge of a crenel, she did hesitate a moment. Guards were posted at intervals here. But— She pulled herself over, hunched down between the merlons, and peeped out. Some meters to left and right she saw the nearest watchers. One was human, one Ikranankan. Their cloaks fluttered as wildly as the banners atop the more distant towers. But they were looking straight outward.

Quick, now! Chee darted across the parapet. As expected—any competent military engineer would have designed things thus—several meters of empty paving stretched between the inside foot of the wall and the nearest houses. With commerce to the outer world suspended, no traffic moved on it. She didn't stop to worry about chance passersby, but spidered herself down with reckless speed. The last few meters she dropped. Low gravity was helpful.

Once she had streaked into the nearest alley, she took a while to pant. No longer than she must, though. She could hear footfalls and croaking voices. Via a window-frame, she got onto the roof of one house.

There she had a wide view. The

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bloated red sun slanted long rays over streets where gratifyingly few natives were abroad. Hours after Adzel's coming, they must still be too shaken to work. *Let's see . . . David's sure to be kept in the palace, which must be that pretentious object in the middle of town.* She plotted a path, roof to roof as much as possible, crossing the narrowest lanes when they were deserted, and started off.

Wariness cost time; but cheap at the price. The worst obstacle lay at the end. Four spacious avenues bordered the royal grounds, and they were far from deserted. Besides a trickle of workaday errands, they milled with anxious clusters of Ikranankans, very humanlike in seeking what comfort they could get from the near presence of their rulers. Chee spent a couple of hours behind a chimney, studying the scene, before a chance came by.

A heavy wagon was trundling down the street in front of her at the same time as an aged native in sweeping official robes was headed for the palace. Chee leaped down into the gut between this house and the next. She had counted on buildings being crowded. The karikuts clopped past, the wagon creaked and rumbled behind, its bulk screened her. She zipped underneath it and trotted along on all fours. At closest approach, she had about three meters to go to the Ikranankan gaffer. If she was noticed, the gardens were immediately beyond, with lots of hedges and bowers to skulk in. But she hoped that wouldn't be necessary.

It wasn't, since she crossed the open space in half a second flat. Twitching up the back of the old fellow's skirt, she dove beneath and let the cloth fall over her.

He stopped. "What? What?" she heard, and turned with him, careful not to brush against his shins. "Krrr-ek? What? Swear I felt . . . no, no. . .uk-k-k . . ." He shambled on. When she judged they were well into the grounds, Chee abandoned him for the nearest bush. Through the leaves she saw him stop again, feel his garments, scratch his head, and depart mumbling.

So far, so good. The next stage

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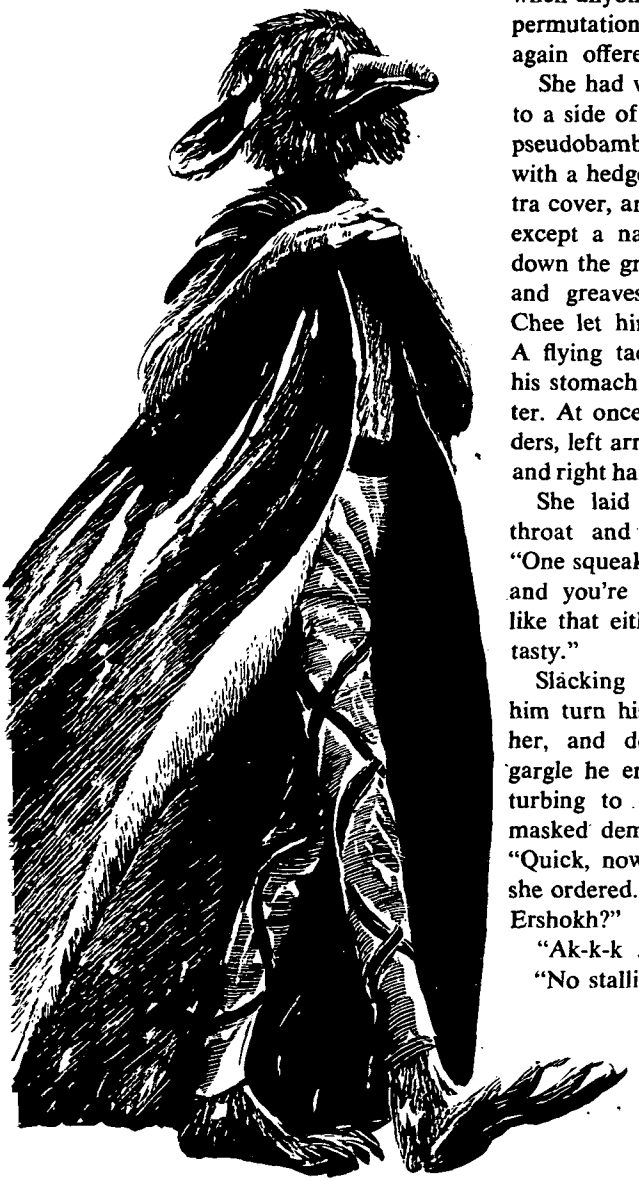

could really get merry. Chee prowled the garden for some while, hiding as only a forester can hide when anyone passed near, until the permutations of perambulation again offered her an opportunity.

She had worked her way around to a side of the palace. A stand of pseudobamboo veiled her from it, with a hedge at right angles for extra cover, and nobody was in sight: except a native guard, scrunching down the gravel path in breastplate and greaves. He ought to know. Chee let him go by and pounced. A flying tackle brought him onto his stomach with a distressing clatter. At once she was on his shoulders, left arm choking off his breath and right hand drawing a knife.

She laid the point against his throat and whispered cheerfully: "One squeak out of you, my friend, and you're cold meat. I wouldn't like that either. You can't be very tasty."

Slacking the pressure, she let him turn his head till he glimpsed her, and decided to pardon the gargle he emitted. It must be disturbing to be set on by a gray-masked demon, even a small one. "Quick, now, if you want to live," she ordered. "Where is the prisoner Ershokh?"

"Ak-k-k . . . uk-k-k—"

"No stalling." Chee pinked him.

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"You know who I mean. The tall yellow-haired beardless person. Tell me or die!"

"He . . . he is in—" Words failed. The soldier made a gallant attempt to rise. Chee throttled him momentarily insensible. She had taken care, while at Haijakata, to get as good a knowledge of Ikranankan anatomy as was possible without dissection. And this was a comparatively feeble species.

When the soldier recovered, he was quite prepared to co-operate. Or anyhow, he was too terrified to invent a lie; Chee had done enough interrogation in her time to be certain of that. She got exact directions for finding the suite. Two Ershoka watched it, but outside a solid bronze door.

"Thank you," she said, and applied pressure again. Cutting some lengths of rope and a strip of his cloak for a gag, she immobilized her informant and rolled him in among the plumed stalks. He was regaining consciousness as she left. "You'll be found before too long, I'm sure," she said. "Probably before they water the garden."

She slipped off. Now there was indeed need to hurry. And she couldn't. Entering the capitol of this nightless city, unnoticed, made everything that had gone before look like tiddlywinks. An open window gave access to a room she had seen was empty. But then it was to get from tapestry to settee to ornamental urn to statue, while aleph-null servants and guards and bureaucrats and tradespeople and petitioners and sisters and cousins and aunts went back and forth through the long corridors; and take a ramp at the moment it was deserted, on the hope that no one would appear before she found her next hiding place; and on and on—By the time she reached the balcony she wanted, whose slender columns touched the eaves, even her nerves were drawn close to breaking.

She shinnied up, swung herself over the roof edge, and crawled to a point directly above a window that must belong to Falkayn's apartment. Her prisoner had told her it was between the second and third north-side balconies. And two stories down, with a wall too smooth for climbing. But she had plenty of rope left, and plenty of chimneys poked from the tiles. She made a loop around the nearest. After a glance to be sure no one was gawping from the ground, she slid.

Checked, she peered in the window. An arabesque grille of age-greened bronze would let her pass, but not a man. *Why* hadn't she thought to search the Katandaran litter for a hacksaw? She reached through and rapped on the glass behind. There was no response. With a remark that really shouldn't have come out of such fluffy white fur, she broke the pane with

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a dagger butt and crept inside. While she looked around, she pulled in the rope.

The rooms were well furnished, if you were an Ikranankan. For a man they were dark and cold, and Falkayn lay asleep curled up like a hawser. Chee padded to the bed, covered his mouth—humans were so ridiculously emotional—and shook him.

He started awake. "Huh? Whuff, whoo, ugh!" Chee laid a finger on her muzzle. His eyes cleared, he nodded and she let him go.

"Chee!" he breathed shakenly. His hands closed around hers. "How the devil?"

"I sneaked in, you idiot. Did you expect me to hire a band? Now let's figure some way to get you out."

Falkayn gasped. "You mean you don't know?"

"How should I?"

He rose to his feet, but without vigor. "Me, too," he said.

Chee's courage sank. She slumped down on the floor.

With a rush of love, Falkayn stooped, lifted her and cradled her in his arms. "Just knowing you tried is enough," he murmured.

Her tail switched. The vinegar returned to her voice. "Not for me it isn't." After a moment: "All we need is an escape from here. Then we can wait in the outback for the relief expedition."

Falkayn shook his head. "Sorry, no. How'd we get in touch? They'd spot *Muddlin' Through,* sure, but as soon as we reached that area, we'd be filled with ironmongery, so Jadhadi could throw the blame for our disappearance on Thorn. He'd probably get away with it, too. You know how these natives would stick together in the face of an alien."

Chee reflected a while. "I could try to slip within voice range of our ship's detectors."

"Hm-m-m." Falkayn ran a hand through his hair. "You know you'd never manage that, as witness the fact you didn't try in the first place. No cover worth itemizing." Rage welled in him. "Damn that chance that Adzel's transceiver got smashed! If we could have called the ship—"

And then his mind rocked. He stumbled back and sat down on the bed. Chee jumped clear and watched with round yellow eyes. The silence grew huge.

Until Falkayn smashed fist into palm and said, "Judas on Mercury! Yes!"

The discipline of his boyhood came back. He'd been drugged and kidnaped and given one figurative belly kick after another, and been unable to do a thing about it, and that had shattered him. Now, as the idea took shape, he knew he was a man yet. The possibility that he would get killed mattered not a hoot in vacuum. Under the thrumming consciousness, his soul laughed for joy.

"Listen," he said. "You could

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get out of town again, even if I can't. But your chance of surviving very long, and Adzel's, wouldn't be worth much. Your chance of being rescued would be still smaller. If you're willing to throw the dice right—go for broke—then—"

Chee did not argue with his plan. She pondered, made a few calculations in her head, and nodded. "Let us."

Falkayn started to put on his clothes, but paused. "Wouldn't you like a nap first?"

"No, I feel quite ready. Yourself?"

Falkayn grinned. His latest sleep had restored him. The blood tingled in his flesh. "Ready to fight elephants, my friend."

Dressed, he went to the door and pounded on it. "Hey!" he shouted. "Help, Emergency! Urgency! Top secret! Priority One! Handle with care! Open this door, you scatchbrains!"

A key clicked in the lock. The door swung wide. A large Ershokh stood in the entrance with drawn sword. His companion waited a discreet distance behind. "Well?"

"I've got to see your boss," Falkayn babbled. Anything to get within arm's length. He stepped closer, waving his hands. "I've thought of something terrible."

"What?" growled from the beard.

"This." Falkayn snatched at the man's cloak, on either side of the brooch, with wrists crossed. He pulled his hands together. The backs of them closed on his victim's larynx. Simultaneously, Chee hurtled into the hall and over the clothes of the other guard.

Falkayn's man slashed downward with his saber, but Falkayn's leg wasn't there any more. That knee had gone straight up. The soldier doubled in anguish. Then strangulation took him. Falkayn let him fall and bounded to the next Ershokh. Chee swarmed on that one, and had so far kept him from uttering more than a few snorts and grunts, but she couldn't overpower him. Falkayn chopped with the blade of a hand. The guard collapsed.

He wasn't badly injured either, Falkayn saw with some relief. He stooped, to drag them both inside and don a uniform. But there had been too much ruckus. A female Ikranankan stuck her head out of an entrance farther down the hall and began to scream. Well, you couldn't have everything. Falkayn grabbed a saber and sped off. Chee loped beside him. The screams hit high C and piled on the decibels.

Down yonder ramp! A courtier was headed up. Falkayn stiff-armed him and continued. Several more were in the corridor below. He waved his sword. "Blood and bones!" he yelled. "Boo!" They cleared a path, falling over each other and clamoring.

And here was the electrical shop. Falkayn stormed in. Across work-

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benches crammed with quaintly designed apparatus, two scientists and several assistants gaped at him. "Everybody out," Falkayn said. When they didn't move fast enough, he paddled the Grand Chief Philosopher of Royal Rangakora with the flat of his blade. They got the message. He slammed the door and shot the bolt.

The uproar came through that heavy metal, louder by the minutes, voices, feet, weapon clatter and alarm drums. He glanced around. The windows gave no access, but another door opened at the far end of the long room. He bolted that too, and busied himself shoving furniture against it. If he piled everything there that wasn't nailed down, and used Chee's rope to secure the mass further, he could probably make it impassable to anyone short of the army engineers. And they wouldn't likely be called, when the other approach looked easier.

He ended his task and returned, breathing hard. Chee had also been busy. She squatted on the floor amid an incredible clutter of batteries and assorted junk, coiling a wire into a helix while she frowned at a condenser jar. She could do no more than guess at capacitances, resistances, inductances, voltages and amperages. However, the guess would be highly educated.

Both doors trembled under fists and boots. Falkayn watched the one he had not reinforced. He stretched, rocked a little on his feet, willed the tension out of his muscles. Behind him, Chee fiddled with a spark gap; he heard the slight frying noise.

A human voice bawled muffled: "Clear the way! Clear the way! We'll break the obscenity thing down, if you'll get out of our obscenity way!" Chee didn't bother to look from her work.

The racket outside died. After a breathless moment, feet pounded and a weight smashed at the bronze. It rang and buckled. Again the ram struck. This time a sound of splintering was followed by hearty curses. Falkayn grinned. They must have used a baulk of glued-together timber, which had proved less than satisfactory. He went to a gap where the door had been bent a little clear of the jamb and had a look. Several Ershoka could be seen, in full canonicals, fury alive on their faces. "Peekaboo," Falkayn said.

"Get a smith!" He thought he recognized Hugh Padrick's cry. "You, there, get an obscenity smith. And hammers and cold chisels."

That would do the job, but time would be needed. Falkayn returned to help Chee. "Think we've got ample juice in those batteries?" he asked.

"Oh, yes." She kept eyes at the single workbench not manning the barricade, where she improvised a telegraph key out of scrap metal.

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"Only four hundred kilometers or so, right. Even Adzel made it in a few standard days. What worries me is getting the right frequency."

"Well, estimate as close as you can, and then use different values. You know, make a variable contact along a wire."

"Of course I know! Didn't we plan this in your rooms? Stop yattering and get useful."

"I'm more the handsome type," said Falkayn. He wielded a pair of pliers awkwardly—they weren't meant for a human grasp—to hook the batteries in series. And a Leyden jar, though you really should call it a Rangakora jar—

The door belled and shuddered. Falkayn kept half his mind in that direction. Probably somewhat less than an hour had passed since he crashed out. Not a hell of a lot of time to play Heinrich Hertz. But Chee had put on the last touches. She squatted before the ungainly sprawl of apparatus, tapped her key, and nodded. A spark sizzled across a gap. She went into a rattle of League code. Invisible, impalpable, the radio waves surged forth.

Now everything depended on her finding the waveband of the late lamented transceivers, somewhere among those she could blindly try. She hadn't long, either. The door would give way in another minute or two. Falkayn left for his post.

The bolt sprang loose. The door sagged open. An Ershokh pushed in, sword a-shimmer.

Falkayn crossed blades. Steel chimed. As expected, the man was a sucker for scientific fencing. Falkayn could have killed him in thirty seconds. But he didn't want to. Besides, while he held this chap in the doorway, no others could get past. "Having fun?" he called across the whirring edges. Rage snarled back at him.

Dit-dit-dah-dit. . . . Come to *Rangakora. Land fifty meters outside the south gate. Dit-dah-dah.* Clash, rattle, clang!

The Ershokh got his back to the jamb. Abruptly he sidled past the entrance, and another man was there. Falkayn held the first one by sheer energy while his foot lashed out in an epical savate kick. The second man yelped agony and lurched back into the arms of his fellows. Whirling, Falkayn deflected the blade of the first one with a quick beat and followed with a glide. His point sank into the forearm. He twisted deftly, ripping through tissue, and heard the enemy saber clank on the floor.

Not stopping to pull his own weapon free, he turned and barely avoided the slash of a third warrior. He took one step forward and grabbed, karate style. A tug—a rather dreadful snapping noise—the Ershokh went to his knees, gray-faced and broken-armed, and Falkayn had his blade. It rang on the next.

The Hermetian's eyes flicked from side to side. The man he had

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cut was hunched over. Blood spurted from his wound, an impossibly brilliant red. The other casualty sat slumped against the wall. Falkayn looked into the visage that confronted him—a downy-cheeked kid, as he'd been himself not so long ago—and said, "If you'll hold off a bit, these busters can crawl out and get help."

The boy cursed and hacked at him. He caught the sword with his own in a bind and held fast. "Do you want your chum to bleed to death?" he asked. "Relax. I won't hurt you. I'm really quite peaceful as long as you feed me."

He disengaged and poised on guard. The boy stared at him an instant, then backed off, into the crowd of humans and Ikranankans that eddied in the corridor behind him. Falkayn nudged the hurt men with a foot. "Go on," he said gently. They crept past him, into a descending hush.

Hugh Padrick trod to the forefront. His blade was out, but held low. His features worked. "What're you about?" he rasped.

"Very terrible magic," Falkayn told him. "We'll save trouble all around if you surrender right now."

Dit-dah-dah-dah!

"What do you want of us?" Padrick asked.

"Well, to start with, a long drink. After that we can talk." Falkayn tried to moisten his lips, without great success. Damn this air! No wonder the natives didn't go in for rugs. Life would become one long series of static shocks. Maybe that was what had first gotten the Rangakorans interested in electricity.

"We might talk, yes." Padrick's saber drooped further. Then in a blinding split second it hewed at Falkayn's calf.

The Hermetian's trained body reacted before his mind had quite engaged gears. He leaped straight up, under two-thirds of a Terrestrial gee. The whetted metal hissed beneath his bootsoles. He came down before it could withdraw. His weight tore the weapon from Padrick's grasp. "Naughty!" he cried. His left fist rocketed forward. Padrick went on his bottom, nose a red ruin. Falkayn made a mental note that he be charged through that same nose for plastic surgery, if and when van Rijn's factors got around to offering such services.

An Ikranankan poked a spear at him. He batted it aside and took it away. That gained him a minute.

He got another while Padrick reeled erect and vanished in the mob. And still another passed while they stared and shuffled their feet. Then he heard Bobert Thorn trumpet, "Clear the way! Crossbows!" —and knew that the end was on hand.

The crowd parted, right and left, out of his view. Half a dozen Ikranankan archers tramped into sight and took their stance before

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him, across the hall. But he put on the most daredevil grin in his repertory when Stepha ran ahead of them.

She stopped and regarded him with wonder. "David," she breathed. "No other man in the world could've— And I never knew."

"You do now." Since her dagger was sheathed, he risked chucking her under the chin. "They teach us more where I've been than how to handle machines. Not that I'd mind a nice safe armored vehicle."

Tears blurred the gray eyes. "You've got to give up, though," she begged. "What more can anyone do?"

"This," he said, dropped his saber and grabbed her. She yelled and fought back with considerable strength, but his was more. He pinioned her in front of him and said to the archers, "Go away, you ugly people." The scent of her hair was warm in his nostrils.

Imperturbably, Chee continued to signal.

Stepha stopped squirming. He felt her stiffen in his grip. She said with an iron pride, "No, go 'head and shoot."

"You don't mean that!" he stammered.

"Sure do." She gave him a forlorn smile. "Think an Ershokh's less ready to die than you are?"

The archers took aim.

Falkayn shook his head. "Well," he said, and even achieved a laugh, "when the stakes are high, people bluff." A howl, a babble, distant but rising and nearing, didn't seem very important. "Of course I wouldn't've used you for a shield. I'm an awful liar, and you have better uses." He kissed her. She responded. Her hands moved over his back and around his neck.

Which was fun, and moreover gained a few extra seconds . . .

"The demon, the demon!" Men and Ikranankans pelted by. A thunderclap was followed by the sound of falling masonry.

Stepha didn't join the stampede. But she pulled free, and the dagger flashed into her hand. "What's that?" she cried.

Falkayn gusted the air from his lungs. His head swam. Somehow he kept his tone level. "That," he said, "was our ship. She landed and took Adzel on for a pilot, and now he's aloft, losing merit but having a ball with a mild demonstration of strength." He took her hand. "Come on, let's go out where he can see us and get taken aboard. I'm overdue for a dry martini."

XI

The conference was held on neutral ground, an autonomous Chakoran village between the regions claimed of old by Katandara and Rangakora. (Autonomy meant that it paid tribute to both of them.) Being careful to observe every possible formality and not hurt one

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party's feelings more than another's, Falkayn let its head preside at the opening ceremonies. They were interminable. His eyes must needs wander, around the reddish gloom of the council hut, over the patterns of the woven walls, across the local males who squatted with their spears as a sort of honor guard, and back to the long stone table at which the conference was benched. He wished he could be outside. A cheerful bustle and chatter drifted to him through the open door, where Adzel lay so patiently; the soldiers who had escorted their various chiefs here were fraternizing.

You couldn't say that for the chiefs themselves. King Ursala had finished droning through a long list of his grievances and desires, and now fidgeted while Emperor Jadhadi embarked on his own. Harry Smit glared at Bobert Thorn, who glared back. The Ershoka senior still blamed his phratry's troubles on the rebellion. His honor the mayor of this town rustled papers, doubtless preparing an introduction to the next harangue.

Well, Falkayn thought, *this was your idea, lad. And your turn has got to come sometime.*

When the spaceship hovered low above them and a giant's voice boomed forth, suggesting a general armistice and treaty-making, the factions had agreed. They didn't know they had a choice. Falkayn would never have fired on them, but he saw no reason to tell them that. No doubt Chee Lan, seated before the pilot board in the sky overhead, had more to do now with keeping matters orderly than Adzel's overwhelming presence. But why did they have to make these speeches? The issues were simple. Jadhadi wanted Rangakora, and felt he could no longer trust the Ershoka. A large number of the Ershoka wanted Rangakora, too; the rest wished for the *status quo* ante, or a reasonable substitute, but didn't see how to get it; each group felt betrayed by the other. Ursala wanted all foreign devils out of his town, plus a whopping indemnity for damages suffered. And Falkayn wanted—well, he'd tell them. He lit his pipe and consoled himself with thoughts of Stepha, who awaited him in the village. Quite a girl, that, for recreation if not for a lifetime partner.

An hour passed.

". . .. The distinguished representative of the merchant adventurers from Beyond-The-World, Da'id 'Alk'ayn."

His boredom evaporated. He rose to his feet in a tide of eagerness that he could barely mask with a smile and a casual drawl.

"Thank you, most noble," he said. "After listening to these magnificent orations, I won't even try to match them. I'll state my position in a few simple words." That should win him universal gratitude!

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"We came here in good faith," he said, "offering to sell you goods such as I have demonstrated at unbelievably reasonable prices. What happened? We were assaulted with murderous intent. I myself was imprisoned and humiliated. Our property was illegally sequestered. And frankly, most nobles, you can be plaguey thankful none of us were killed." He touched his blaster. "Remember, we do represent a great power, which has a fixed policy of avenging harm done to its people." *When expedient,* he added, and saw how Jadhadi's ruff rose with terror and Smit's knuckles stood white on his fist.

"Relax, relax," he urged. "We're in no unfriendly mood. Besides, we want to trade, and you can't trade during a war. That's one reason I asked for this get-together. If the differences between us can be settled, why, that's to the League's advantage. And to yours, too. You do want what we have to sell, don't you?

"So." He leaned forward, resting his fingertips on the table. "I think a compromise is possible. Everybody will give up something, and get something, and as soon as trade starts you'll be so wealthy that what you lost today will make you laugh. Here's a rough outline of the general agreement I shall propose.

"First, Rangakora will be guaranteed complete independence, but drop claims to indemnification—"

"Most noble!" Jadhadi and Ursala sprang up and yelled into each other's beaks.

Falkayn waved them to silence. "I yield for a question to King Ursala," he said, or the equivalent thereof.

"Our casualties . . . crops ruined . . . dependent villages looted . . . buildings destroyed—" Ursala stopped, collected himself, and said with more dignity: "We were not the aggressors."

"I know," Falkayn said, "and I sympathize. However, weren't you prepared to fight for your freedom? Which you now have. That should be worth something. Don't forget, the League will be a party to any treaty we arrive at here. If that treaty guarantees your independence, the League will back the guarantee." *Not strictly true. Only Solar Spice & Liquors is to be involved. Oh, well, makes no practical difference.* He nodded at Jadhadi. "By my standards, most noble, you should pay for the harm you did. I'm passing that in the interests of reconciliation."

"But my borders," the Emperor protested. "I must have strong borders. Besides, I have a rightful claim to Rangakora. My great ancestor, the first Jadhadi—"

Falkayn heroically refrained from telling him what to do to his great ancestor, and merely answered in his stiffest voice: "Most noble, please consider yourself let off very lightly. You did endanger

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the lives of League agents. You cannot expect the League not to exact some penalty. Yielding Rangakora is mild indeed." He glanced at his blaster, and Jadhadi shivered. "As for your border defenses," Falkayn said, "the League can help you there. Not to mention the fact that we will sell you firearms. You won't need your Ershoka any more."

Jadhadi sat down. One could almost see the wheels turning in his head.

Falkayn looked at Thorn, who was sputtering. "The loss of Rangakora is your penalty, too," he said. "Your followers did seize me, you know."

"But what shall we do?" cried old Harry Smit. "Where shall we go?"

"Earth?" Thorn growled. Falkayn had been laying it on thick of late, how alien Earth was to these castaways. They weren't interested in repatriation any more. He didn't feel guilty about that. They would in fact be happier here, where they had been born. And, if they were staying of their own free choice, van Rijn's traders could be trusted to keep silence. In the course of the next generation or two—the secret wouldn't last longer in any event—their children and grandchildren could gradually be integrated into galactic civilization, much as Adzel had been.

"No, if you don't want to," Falkayn said. "But what has your occupation been? Soldiering. Some of you keep farms, ranches, or town houses. No reason why you can't continue to do so; foreigners have often owned property in another country. Because what you should do is establish a nation in your own right. Not in any particular territory. Everything hereabouts is already claimed. But you can be an itinerant people. There are precedents, like nomads and Gypsies on ancient Earth. Or, more to the point, there are those nations on Cynthia which are trade routes rather than areas. My friend Chee Lan can explain the details of organization to you. As for work—well, you are warriors, and the planet is full of barbarians, and once the League gets started here there are going to be more caravans to protect than fighters to protect them. You can command high prices for your service. You'll get rich."

He beamed at the assembly. "In fact, we'll all get rich."

"Missionaries," said Adzel into the pensive silence.

"Uh, yes, I'd forgotten," Falkayn said. "I don't imagine anyone will object if the ships bring an occasional teacher? We would like to explain our beliefs to you."

The point looked so minor that no one argued. Yet it would bring more changes in the long run than machinery or medicine. The Katandarans would surely leap at Buddhism, which was infinitely

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more comfortable than their own demonology. Together with what scientific knowledge trickled down to them, the religion would wean them from their hostility complex. Result: a stable culture with which Nicholas van Rijn could do business.

Falkayn spread his hands. "That's the gist of my suggestions," he finished. "What I propose is what an Earthman once called an equality of dissatisfaction. After which the League traders will bring more satisfactions to you than you can now imagine."

Thorn bit his lip. He wouldn't easily abandon his dream of kingship. "Suppose we refuse?" he said.

"Well," Falkayn reminded him, "the League has been offended. We must insist on some retribution. My demands are nominal. Aren't they?"

He had them, he knew. The carrot of trade and the stick of war; they didn't know the war threat was pure bluff. They'd make the settlement he wanted.

But of course they'd do so with endless bargaining, recrimination, quibbles over details, speeches—oh, God, the speeches! Falkayn stepped back. "I realize this is a lot to swallow at once," he said. "Why don't we recess? After everyone's had time to think, and had a good sleep, we can talk to more purpose."

Mainly, he wanted to get back to Stepha. He'd promised her a jaunt in the spaceship; and Adzel and Chee could jolly well wait right here. When the assembly agreed to break, Falkayn was the first one out the door.

Metal hummed. The viewport blazed with stars in an infinite night. That red spark which was Ikrananka's sun dwindled swiftly toward invisibility.

Staring yonder, Falkayn sighed. "A whole world," he mused. "So many lives and hopes. Seems wrong for us to turn them over to somebody else."

"I know why you would go back," Chee Lan clipped. "But Adzel and I have no such reason. We've a long way to Earth—"

Falkayn brightened. He had analogous motives for looking forward to journey's end.

". . . So move your lazy legs," Chee said.

Falkayn accompanied her to the saloon. Adzel was already there, arranging chips in neat stacks. "You know," Falkayn remarked as he sat down, "we're a new breed. Not troubleshooters. Troubletwisters. I suspect our whole career is going to be a sequence of ghastly situations that somehow we twist around to our advantage."

"Shut up and shuffle," Chee said. "First jack deals."

A pair of uninteresting hands went by, and then Falkayn got a flush. He bet. Adzel folded. Chee saw him. The computer raised.

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Falkayn raised back. Chee quit and the computer raised again. This went on for some time before the draw. Muddlehead must have a good hand, Falkayn knew, but considering its style of play, a flush was worth staying on. He stood pat. The computer asked for one card.

Judas in a nova burst! The damned machine must have gotten four of a kind! Falkayn tossed down his own. "Never mind," he said. "Take it."

Somewhat later, Chee had a similar experience, still more expensive. She made remarks that ionized the air.

Adzel's turn came when the other two beings dropped out. Back and forth the raises went, between dragon and computer, until he finally got nervous and called.

"You win," said the mechanical voice. Adzel dropped his full house, along with his jaw.

"What?" Chee screamed. Her tail stood vertical and bottled. "You were bluffing?"

"Yes," said Muddlehead.

"But, no, wait, you play on IOU's and we limit you," Falkayn rattled. "You can't bluff!"

"If you will inspect the No. 44 hold," said Muddlehead, "you will find a considerable amount of furs, jewels, and spices. While the value cannot be set exactly until the market involved has stabilized, it is obviously large. I got them in exchange for calculating probability tables for the native Gujgengi, and am now prepared to purchase chips in the normal manner."

"But, but, but you're a machine!"

"I am not programmed to predict how a court would adjudicate title to those articles," said Muddlehead. "However, my understanding is that in a commercially and individualistically oriented civilization, any legitimate earnings belong to the earner."

"Good Lord," said Falkayn weakly, "I think you're right."

"You're not a person!" Chee shouted. "Not even in fact, let alone the law!"

"I acquired those goods in pursuit of the objective you have programmed into me," Muddlehead replied, "namely, to play poker. Logic indicates that I can play better poker when properly staked."

Adzel sighed. "That's right, too," he conceded. "If we want the ship to give us an honest game, we have to take the syllogistic consequences. Otherwise the programming would become impossibly complicated. Besides . . . sportsmanship, you know."

Chee riffled the deck. "All right," she said grimly. "I'll win your stake the hard way."

Of course she didn't. Nobody did. With that much wealth at its disposal, Muddlehead could afford to play big. It didn't rake in their entire commissions for Operation Ikrananka in the course of the Earthward voyage, but it made a substantial dent in them. ■

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BEAUTIFUL VENUS

"The surface of Venus appears to be a forbidding place, with surface temperatures comparable to a red-hot oven and pressures that exist on Earth only at ocean depths greater than 350 meters. Since the melting points of aluminum, lead, tin, magnesium, zinc, and bismuth might be reached, pools of molten surface material could cover much of the bright side. The high pressures may produce clouds of exotic materials that would ordinarily be gases at such temperatures.

"The temperature of the dark pole has been estimated by Drake to be 540° Kelvin, and with the high surface pressures, several possible constituents of the lower atmosphere may condense out in that region. Such polar seas may contain liquid benzene, liquid acetic acid, liquid butyric acid, liquid phenol, and if the pressure exceeds 60 atmospheres, perhaps a bit of liquid water. . . . If this model is valid, a surface landing presents an engineering problem of a magnitude never encountered before."

From SKY AND TELESCOPE, *March, 1965*

Ah, those shining seas of molten magnesium and aluminum, lapping against the silica sands! The puddles of acetic and butyric acid shimmering placidly on the bright surface of the molten metals!

Maybe an astronomer can imagine such a scene—but no science-fiction author would get away with it.

There may be red-hot mountains of TNT and 50-ton boulders of pure plutonium, too.

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REVIEWS

A CHECKLIST OF SCIENCE FICTION ANTHOLOGIES

Compiled by W. R. Cole • The Author, 1171 East 8th Street, Brooklyn 30, New York • 1964 • 374 & xvi pp. • $7.50

This is going to be a hellish year for decisions if SF fandom decides to award a special "Hugo" for outstanding special fan publications at the 1965 World Convention in London. In 1964 we have had not one but two long-awaited bibliographical works, both worth waiting for: Rev. Henry H. Heins' "A Golden Anniversary Bibliography of Edgar Rice Burroughs," and now Walt Cole's "Checklist of SF Anthologies." The latter is right at the front of my shelf of useful SF reference books, along with the Bleiler-Dikty "Checklist of Fantastic Literature," Donald Day's "Index to the Science Fiction Magazines," Donald Tuck's "Handbook of Science Fiction and Fantasy," and Brad Day's several publications.

Here is a complete, and completely cross-indexed checklist of science fiction anthologies published in English between 1927 and 1963. (Publication was delayed to include a supplementary section for 1962-'63.) Purely weird and fantastic collections are omitted, but anthologies containing both SF and fantasy are indexed. The grand total adds up to two hundred twenty-seven books, nearly twenty-seven hundred stories and over five hundred authors. Isaac Asimov and Theodore Sturgeon, who has contributed an appreciative introduction, lead the field of anthologized writers.

You get first a listing of the anthologies by title; then an index by

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editor which is the main entry, and gives the contents of each collection with the magazine or other source from which the story was reprinted. This is a feature I intend to use often. A third section lists stories by title, so that you can find the book that contains it, and the fourth is an author index. Either of these sections is your key to a specific story you want to find.

The compiler has done some counting up and is rather diffident about the results. Of the "Big Three" magazines, Astounding/Analog, *Galaxy* and *Fantasy & Science Fiction,* the latter publishes both fantasy and science fiction and consequently has an edge on the purely science-fiction magazines. In the period from Fall, 1950 through 1963, when all three magazines were published, *F&SF* had 187 stories in anthologies, *Galaxy* had 164 and ASF had 136. But ASF was often and well represented in anthologies and with stories published before late 1950, and — though I haven't had the stamina to count—I am reasonably certain that with science fiction alone it has not only narrowed the gap, but probably closed it. If anyone does want to count, let me know the result. . .

THE LIZARD LORDS

By Stanton A. Coblentz • Avalon Books, New York • 1964 • 192 pp. $2.95

Avalon's SF is a notch above the new Arcadia House line but it's a small notch. This time the king of ham-handed satire has done an almost straight formula piece. Earth people are kidnaped by super-lizards from the planet Drumgrade, who are picking up specimens for the town zoo. Once on Drumgrade, some make out, some don't; all of them feel like rats in a cage because, to the lizards, that's what they are. But there are noble lizards, too, and in due course our heroes join forces with them to overthrow the bad guys and get a different lot of crooks a spot beside the gravy pot. In payment, they come home. End of story.

THE THREE STIGMATA OF PALMER ELDRITCH

By Philip K. Dick • Doubleday & Co., Garden City, N.Y. • 1965 • 278 pp. • $4.95

An author can't come up with a "Man In the High Castle" every time, but in this case Philip K. Dick certainly didn't try. This time he's standing in for A.E. van Vogt, or maybe for a Pohl-Van Vogt collaboration. The result is wild, zany, and lively, but not very memorable.

Today's "Barbie" dolls are obviously the inspiration for Perky Pat Layouts, around which the story wheels and whirls. With a little aid from a nicely habit-forming drug, peddled *sub rosa* by P.P.E. along with the minutely detailed Perky Pat layouts, the bored people of the overcrowded future live it up by imagining themselves into the sur-

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rogate worlds they have built up. As with model railroaders and their hobby, there is no limit to the detail with which the miniature sets can be constructed; a goodly chunk of the economy hangs on it, and on the planets, to which segments of the overpopulated Earth are shipped to molder after being "drafted," these installations are all the life worth living.

Then a wheeler-dealer comes back from Alpha Centauri with a more potent drug and layouts of a more perplexingly entrapping type, and the plot starts to get tangled. Is the mysterious Palmer Eldritch the villain of the piece or the hero. In fact, just what is going on from moment to moment? The only way you'll ever find out is by reading the book, and you may be confused then.

THE EXILE OF TIME

By Ray Cummings • Avalon Books, New York • 1964 • 192 pp. • $2.95

TIME TUNNEL

By Murray Leinster • Pyramid Books, New York • No. R-1043 • 140 pp. • 50¢

These two books, one hardbound, the other a paperback, provide an interesting contrast. The Cummings yarn is a typical time-travel story of 1931, when it was serialized in the April-July issues of Astounding. The paperback shows how the old master, Murray Leinster, does the same kind of thing with professional smoothness.

The Cummings story has the Cummings formula and the Cummings style, which Avalon's SF editor, veteran fan Robert A.W. "Doc" Lowndes, has shown elsewhere to be the result of Cummings' years in Puerto Rico. (Lowndes' introductions to these older stories are a treat.) An evil, crippled genius uses a time cage to shuttle back and forth at breakneck speed, trying 1777, 1935 and 2930. He is aided by a malignant robot, leader of a brewing robot revolt in the thirtieth century. Heroes and heroines from all three eras scamper back and forth at breakneck speed, trying to foil the villains and save the world and themselves. Cummings' choppy, breathless narration in fragmentary, blurted clauses . . . "stream-of-consciousness" with sentence structure of a kind . . . is beautifully fitted to the kind of story he usually told.

Murray Leinster's yarn, although less intricate on the surface, employs characterization and history to round out a rich adventure in time. The time tunnel of the title bores through the fabric of the universe, connecting a hillside in present-day France with an abandoned warehouse in Napoleon's time. A small and pragmatic gang are using the tunnel to "import" high-grade Napoleonic artifacts for sale as "new" antiques, too fine and too cheap to be fakes. Then a student of the inventor comes across evidence of anachronisms in his historical stud-

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ies, and they join forces to find out who is meddling with the structure of time and creating too-probable alternate time tracks.

You might say, to strain a simile, that the difference between the two stories is very like the difference between a Broadway musical of Cummings' era (1920-1930) and "My Fair Lady".

SIMULACRON-3

By Daniel F. Galouye • Bantam Books, New York • No. J-2797 • 1964 • 152 pp. • 40¢

This is by no means the "sleeper" masterpiece that the author's "Dark Universe" was, but it's an interesting variation on the old Quaker Oats concept, and a somewhat indirect satire on opinion polling that calls for the heavier hand of a Frederik Pohl.

Douglas Hall is a top scientist in Reactions, Inc., an industry that promises to upset the domination of twenty-second century society by the ravening pollsters. Simulacron-3 is a simulated human society, a small city whose "people" are electronic complexes in a gigantic computer. So thoroughly have these simulated entities been individualized that they can be used as an experimental population for opinion polling. Variables can be introduced into their synthetic society, and the reactions of the interrelating circuits studied with as much validity as the Reaction Monitors can sample "real" society.

Then things begin to happen. Hall has sudden blackouts. His chief is killed. His boss plans to use the Simulacron to gain political control of the country. People appear and disappear; records vanish; there are attempts to kill Hall himself. A near civil war is breeding against REIN. And just before the midpoint of the book, Hall discovers the key fact: we in our world are ID units in the simulated sample universe of another world, whose Operator is mad. The rest is a long chase sequence with a telegraphed ending. The book is more fun before the big secret is spilled.

REPRINTS

DAVY

By Edgar Pangborn • Ballantine Books, New York • No. U-6018 • 1964 • 266 pp. • 75¢

My candidate for the best SF novel of 1964. If it misses, I guarantee it will have the "sleeper" status of books like Stewart's "Earth Abides" and Fletcher Pratt's "Well of the Unicorn."

A FOR ANDROMEDA

By Fred Hoyle and John Elliot • Crest Books, Greenwich, Conn. • No. D-773 • 1964 • 205 pp. • 50¢

Reprint of the 1962 novel that offers what is perhaps the only feasible technique for communication over galactic distances. Not Hoyle's best, however. (Sequel coming in 1965.)

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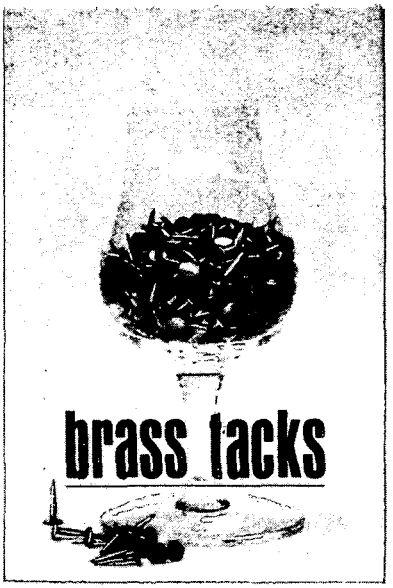

Dear Mr. Campbell:

Re your "Hyperinfracaniphilia" editorial: one cannot help but agree with the stand you defend. These "poor, underprivileged, distraught persons" are, for the most part, in this condition not because they are "social misfits, outcasts," but because they *choose* to be this type of citizen.

Certain of these people prefer to believe that society—forgive the cliché—is taking advantage of them. Precisely the opposite is true: it is *they* who are taking advantage of society! Permit me to explain. The "Appalachia" region of the United States will, according to the President, receive in the vicinity of one *billion* dollars over an extended period; let's say five years. If the people accepting this aid felt moved to the degree of gaining employment, it is evident that this capital could be expended on more worthwhile projects, and not merely poured down the drain, so to speak. Upon reflection, it becomes painfully evident to me that when one receives money with "no strings attached," one does not feel overly inclined to employ oneself.

Jay Kridner

Industries can't get started there because there is no supply of workers. Therefore those who can and will work have been forced to move away!

Dear John:

When I read Analog for March 1965, Theodore L. Thomas's article, "The Twenty Lost Years of Solid-State Physics," jarred me. Perhaps because I named the transistor, I have a paternal affection for it, even though I had nothing to do with inventing the device. I don't think that Julius E. Lilienfeld did, either.

In an article in *Physics Today* of February 1964, entitled "Invention of the Solid-State Amplifier," Virgil E. Bottom makes the same claims for Lilienfeld that Thomas does. In "More on the Solid-State Amplifier and Dr. Lilienfeld," *Physics Today*, May 1964, J. B. Johnson—the discoverer of Johnson noise, or thermal noise—sets matters straight. I'm sending you reproductions of Bottom's and Johnson's papers, but I thought that

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Analog readers would also like to know what Johnson's conclusions —and mine—are.

Thomas says in the second sentence of his article "Here is the way it works." But, we have no evidence that the amplifier Lilienfeld described did work. Johnson says merely:

"Whether Lilienfeld actually had an amplifier delivering useful output power we do not know, and he almost certainly could not have used it in the radio circuit which he shows for illustration because of frequency limitation." . . . "at one time I tried conscientiously to reproduce Lilienfeld's structure according to his specification and could observe no amplification or even modulation. The reason was probably the very low mobility of holes in Cu_2S (~ 1 cm^2V-sec.), and the effect of surface states on the free surface of the film."

I will only add that if Lilienfeld actually constructed an amplifier, it is strange that he did not exploit it, and it is a strange patent that does not teach a competent physicist how to make a device if the device can indeed be made. As Thomas says, it is the claims in the patent that define the invention, and claims cover a process, a machine, an article or a composition. They are practical things that can be seen and tested. The inventor is only required to say "Here is my invention, described so you can do it, too."

Let us, however, turn to theory, since Bottom and Thomas both discuss theory. They interpret the device illustrated on page 12 of March 1965 Analog as an NPN junction transistor. Johnson sees in it, more reasonably, I think, an effort to make a field-effect amplifier. Field-effect amplifiers were finally constructed out of quite different materials some twenty-five years later.

As to the possibility of Lilienfeld's device being an NPN transistor, Johnson says:

"Wherefrom, then, comes Dr. Bottom's conclusion that the Lilienfeld devices operated like injection transistors? It comes from his *assumption* that the copper-sulfide films in the Lilienfeld structure were *n*-type conductors, while in fact they could not have been. In the first place, Lilienfeld chose to put a *positive* potential on his aluminum-foil electrode in contact with the copper-sulfide film in order to get a high-resistance junction to which a relatively high potential could be applied with little current flow. This can only mean that the film, in modern words, was a *p*-type conductor. Furthermore, cupric sulfide, CuS, is a metallic conductor and could not have been used by Lilienfeld. The cuprous sulfide, Cu_2S, would in the pure state be an insulator but is made a *p*-type semiconductor by an almost inevitable trace of CuS, never *n*-type as Dr. Bottom assumes. It is not known to be in the amphoteric class that can

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be made either *n*-type or *p*-type by certain additives or treatments. Dr. Bottom's unorthodox conclusions are the result of this confusion of *n*-type and *p*-type material."

Johnson goes on to discuss other, more successful work of Lilienfeld, who was an interesting and ingenious experimenter, even if he neither made a solid-state amplifier nor described a means by which one can be made.

John Pierce

So what Lilienfeld had was not a transistor. But it's a shame that no efforts were made to see what could be done with solid-state current control; the vacuum tube was relatively new then, and researchers of the time knew that they Had The Right Answer already, so weren't looking for alternatives.

The Physics Today *article by Dr. Johnson points out that Lilienfeld was the first to demonstrate substantial field-effect electron-emission currents. This phenomenon, too, was dropped from interest for a few decades—and revived only recently in the form of the field emission microscope which permits picturing individual atoms in a crystal.*

Field-effect "transistors"—which are not true transistors, but are solid-state silicon or germanium amplifier devices—have been developed relatively recently. Unlike conventional transistors, which are low-resistance devices, the field-effect transistor shows input resistances measured in thousands of megohms—actually higher than the input of conventional vacuum tubes!

Dear John:

Thank you for sending on to me the comments of John Pierce along with the enclosures.

John really does not have very much to say, and neither does J. B. Johnson. Both appear doubtful about Lilienfeld's transistor, no more.

I am not at all impressed by the fact that Johnson could not build a Lilienfeld transistor that worked. I think all patent attorneys and many technical men recognize the fact that a stranger to a particular bit of technology may often not be able to duplicate immediately the work of one who has lived with it. This is the primary reason why know-how and assistance are commonly granted with a patent license even though the patent disclosure itself fully describes the thing patented. At my own company we have used for years a beater saturation process which produces tons upon tons of product every week. Yet other companies in their laboratories cannot make our process work. However, once one of our people has guided the hand of a stranger a sufficient number of times in running the process, the stranger, too, can then run it. Yet no one has been able to tell what the stranger was doing wrong in the first place.

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Well, as I say, this is nothing new. Apparently neither Johnson nor anyone else went to work on the Lilienfeld devices. And I still assert they are transistors.

Theodore L. Thomas

Dear Mr. Campbell:

In reference to the T. L. Thomas article in the March Analog, the Lilienfeld patent does not describe what today would be known as the NPN junction transistor. Rather, it describes a much "newer" device, the N-channel MOS metal-oxide-semiconductor. I am not debating whether Lilienfeld was ahead of his time or is receiving just credit he is referenced in almost every tutorial article or paper on the MOS to date. What disturbs me is that the two devices were portrayed as being similar, whereas they are vastly different.

You may recall how transistors were often "explained" by comparing them, or more correctly contrasting them, to tubes. What made many tube people unhappy was that transistors have low input impedances thus different circuit design concepts were required. Well, if there are any of these people left, they may rejoice because the MOS characteristics are much like those of a pentode, with the exception that they retain the low supply voltage properties of transistors.

John Hiltebeitel

5 Ohio Avenue
Norwalk, Connecticut

Dear Mr. Campbell:

One word for your editorial in the January, 1965, issue: Bravo!

As World Dictator, I will appropriate Australia, as apologetically as is practical, relocate the present population (gently), leave the tools, farms, et cetera but remove all boats, ships, and aircraft, and dump the Savages there, no matter whose relatives they are. I might decide to leave them a few books on Sociology, in case any of them get tired of slaughtering each other.

And don't argue with me. We dictators are not the most patient people on Earth.

I realize this idea has been tried before, but without enough determination. This time, it will work even better. You are fortunate to have chosen for Dictator a civilized Savage.

C. M. Capps

700 Church Street
San Francisco, Calif. 94114

History indicates that method works fine. It takes a number of generations of enthusiastic and persistent mutual slaughtering—but the process eliminates the barbarian genes. The more enthusiastic the slaughtering, the fewer generations required. The Scots seem to have done it in about fifteen generations (three hundred years), but few groups have shown the rugged determination of the Scots, combining religious, political and clan wars all going simultaneously.

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time career of great profit. *But he doesn't.*

It makes no difference how valuable to him the product of learning will in fact be; what counts is *what he thinks* the balance will be.

Unfortunately, hindsight is notoriously superior to—and usually very different from!—foresight.

The result is that it takes enslavement to teach someone something he needs, but does not want, to know.

The panaceas men have sought for curing the problems of interhuman conflicts down through the ages have all been forms of Education—"teaching 'em a lesson" or simply direct enslavement.

Education, then, is not the simple thing the Liberals think it is; they are operating under the false assumption that people want to become educated. They don't; they want to *be* educated.

Also, many times they want their children to become educated—and therein lies the other hooker in the panacea of Education.

Like most powerful medicines, Education can cure ills—but it has serious side effects.

Education—the product—is a powerful tool. The educated man can think with a trained mind, using powerful techniques of analysis and evaluation. He has acquired data from many fields, and from many viewpoints, from six thousand years of history. A mind of a given level of competence, armed with these powerful tools, can outdo an equally competent but untrained mind as a man with a lever can do things no man can achieve with bare hands. Sure, Education *is* slavery—but that just represents the fact that nothing, not even slavery, is inherently evil or destructive. It just feels that way. Having a dentist drill on your teeth hurts; it *feels* injurious, though it is in fact therapeutic. The product of the painful process of education is a mental power unachievable otherwise.

That's the side effect. The "backward nations," the "underprivileged people," the undereducated, all want their children to be educated—to have the power, the status, the respect of the educated man. (Of course *they* don't want to undergo education themselves; education is something you're glad to give someone else, and glad to have, but not something you want to receive!)

So the children are enslaved in an educational system, and begin to learn. And shortly the parents discover the unwelcome side effects of that powerful medicine for social ills—the children start challenging the parental beliefs. And, since the children have learned new and sharper ways of thinking, and have gathered data and methods the parents don't know—the children can,

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and do outthink their parents.

And this, my friends, is one of the things that produces Grade A #1 Juvenile Delinquents. The children have been enslaved—as children always have been, at chores not of their own choosing—and made to learn things, with parents and society alike assuring them that their unhappy efforts at learning this unwanted stuff will, in the long run, be richly rewarded.

When they do learn it, when they do learn to think new thoughts, evaluate with new data . . . parents turn with a heavy hand to suppress them for using it.

In many places in the world, teachers cannot be sent in to teach the children, because the parents don't want their children taught those evil, alien ways. And the parents will kill the perverters of their children in defense of their way of life. (You think we are the only ones who are willing to fight and die for those things we consider the right way, Our Way of Life?) There, it's big and spectacular, and you can see it at work in public.

But the suppression of the new ideas, the new sharpness of thought-analysis, causes an equally angry defense of the parental way of life —and thought—in the home. When The Old Man is an ignorant, obstinate fool, and Junior can prove it—this helps, maybe, to promote family peace?

Educational Opportunities are a strange and powerful catalyst; they can, like any catalyst, promote a reaction—change its rate—but cannot *cause* a reaction.

One of the most spectacular instances of the effects of Educational Opportunities occurred when the Dew Line was being constructed across the arctic areas of North America.

Most of us who live in the temperate south think of all dwellers in the arctic zone as Eskimos. They aren't; there are a number of Indian tribes, who are culturally and genetically a distinct people. Some of them seem to be poorly adapted mentally to an arctic existence. One tribe that lives in the Great Slave Lake region builds *open-ended* long-houses, communal dwellings, I am told. Since the winters there normally get down to 70° below zero, these people appear to take the prize for the lowest *indoor* temperatures on Earth. There is some question as to whether such people are unusually stupid, or unusually tough.

The Dew Line technicians, when they moved into the arctic, were technicians—not anthropologists. To them, arctic-living people were Eskimos. Period.

They encountered, in several areas, natives who had about as much knowledge of white men as the average American has of African Bushmen. We know that such a people has been reported to exist somewhere way off that way. These

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arctic people aren't given to world traveling.

In one area, the Dew Line station was being built in Eskimo territory. The location was picked for technological-geological-topological reasons, not for cultural purposes. There never had been any Eskimo community there. But with the Dew Line technicians, came supplies, jobs, money, and opportunity to earn luxuries, so a community of some four hundred Eskimo men, women and children built up rapidly.

The Eskimo men, women, and children set about organizing a community, and learning to work on the Dew Line job. Boys and men took jobs, learned English, and learned new skills. They learned, and learned, and learned rapidly and thoroughly. The Eskimo men were, presently, fully rated machinists and electrician's helpers and electricians —one Eskimo became the local Union shop steward.

They earned the respect of the white technicians, and were freely welcome at the mess hall.

Meanwhile, the community that had grown up was well organized, and well run; the older men decided community affairs, maintained discipline, and assigned community work, in a manner generally aligned with Eskimo tradition. The younger men accepted and co-operated. The community was peaceful and efficient, with little crime problem. There were three cases in which white technicians were accused of rape.

In another area of the arctic, the Dew Line station was being built in a Cree Indian territory. Again, there had been no community at this point—it was suitable for radar scanning, but not for an economic community in the arctic. Again, the natives congregated, drawn by the attraction of jobs and the possibility of earning luxuries.

But these were a different people. The older men, who traditionally ruled the communities by right of seniority, would not learn English—they left that to the young men and boys. Moreover, they didn't learn skills useful to the Dew Line technicians; they were, therefore, employed as unskilled labor.

Since they hadn't—and wouldn't —learn English, all directions had to be transmitted through one of the younger men or boys who had learned English—which was a nuisance to the technicians, and gnawed at the dignity of the older men since they were, in effect, taking orders from boys.

The authority and respect of the older men—on whom community life traditionally depended—was rapidly disintegrated. The younger men, who would learn English, were preferred in the luxury-earning jobs, naturally enough. The older men became more difficult to deal with, and sought more arrogantly to re-establish their authority in the little community.

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The community never did get organized—it never became a community. The Canadian Mounties had to be called in to provide some measure of organization and discipline.

Meanwhile, the women had lost their respect for their men; the source of achievement and luxuries was the white technicians, so why bother with the second-hand route? It was effectively impossible for a white technician to be guilty of rape.

So—and these are the things that Educational Opportunities can do for a people.

For the Crees, that opportunity was a disaster, destroying all discipline, organization, ethics, mores and economics. It exploded their way of life completely, turning the older men against the younger, breaking down every line of respect and recognition of worth. The families were disrupted, and the women turned against the men of the tribe.

Oh . . . incidentally, the anthropologists who studied the history of those two stations were investigating patterns of racial discrimination. Neither that group of Eskimos, that group of Crees, nor the white technicians involved had had any previous contacts with each other; there was, therefore zero pre-judice or bias, either of Eskimos-vs.-whites, Crees-vs.-whites or whites-vs.-natives.

But the anthropologists reported that the white technicans developed strong discrimination against the Crees, and that the Cree workmen were not allowed in the white mess hall.

If the natives can't maintain respect for themselves and each other, can the outsider be expected to respect them?

Education—and Educational Opportunities—are no Magic Panacea. They do not automatically eliminate all the ills societies are heir to. Penicillin is a powerful medicine indeed —but some people are lethally allergic to it. And some societies are lethally allergic to Educational Opportunities.

In this instance, the whites did not try to teach-with-compulsion the Crees how to be technicians; it was truly a case of Educational *Opportunity*. They weren't forced to become technicians, nor whipped for failing to learn English.

The Eskimos accepted the challenge and the opportunity; for them it was a profitable and beneficial thing.

But don't accept the easy notion that educating the children, although the parents won't accept education, will solve all social ills, rebuild a backward community, or end endemic poverty.

Those Crees had a low-level, but workable and livable culture before they were given their Educational Opportunity.

So what have they now that the Dew Line work is over?

The Editor.

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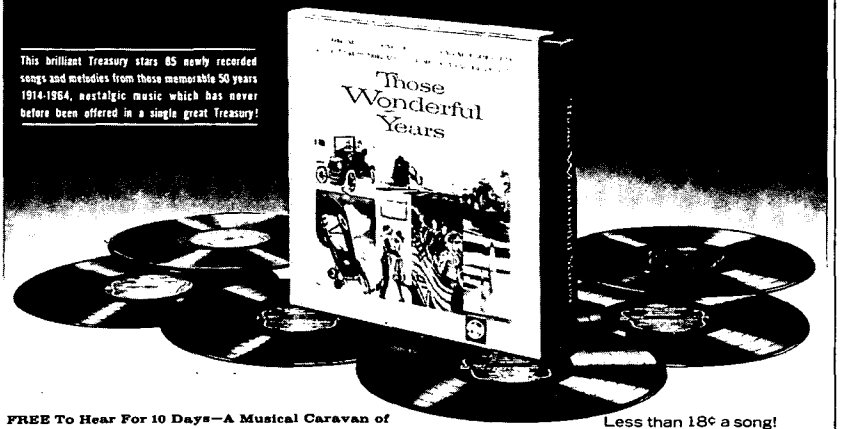

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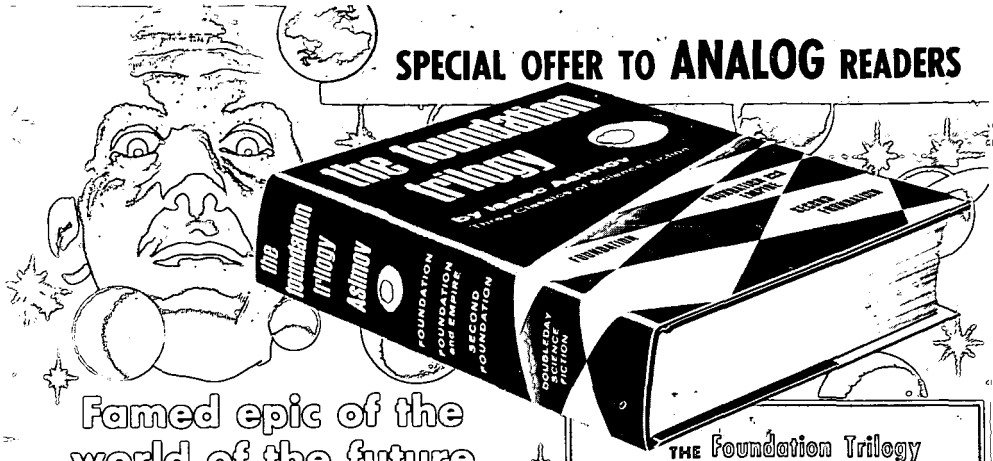

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